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The Journal of the International College of Surgeons

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Vol. 32 NOVEMBER, 1959 No. 5

General Surgery

Hodgkin's Disease of the Cecum

Report of a Case

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Hodgkin's disease may occur in the gastrointestinal tract, though its primary occurrence in the cecum is rare and may be confused grossly, at the operating table, with carcinoma.

The author reviews the literature on Hodgkin's disease of the gastrointestinal tract in general, with special emphasis on the cecum. He reports a case in which Hodgkin's disease was first manifested in the cecum and clinically resembled appendicitis.

HODGKIN'S disease is of unknown cause and usually presents as an enlargement of superficial or mediastinal lymph nodes. The wide variation of organs involved and, therefore, of the symptoms, has long been recognized, and the gastrointestinal tract is by no means spared this involvement. Not infrequently the alimentary tract is involved secondarily and rather late in the course of generalized Hodgkin's disease. Much less frequently the disease originates in the gastrointestinal tract itself, either as a single focus or in several areas. This

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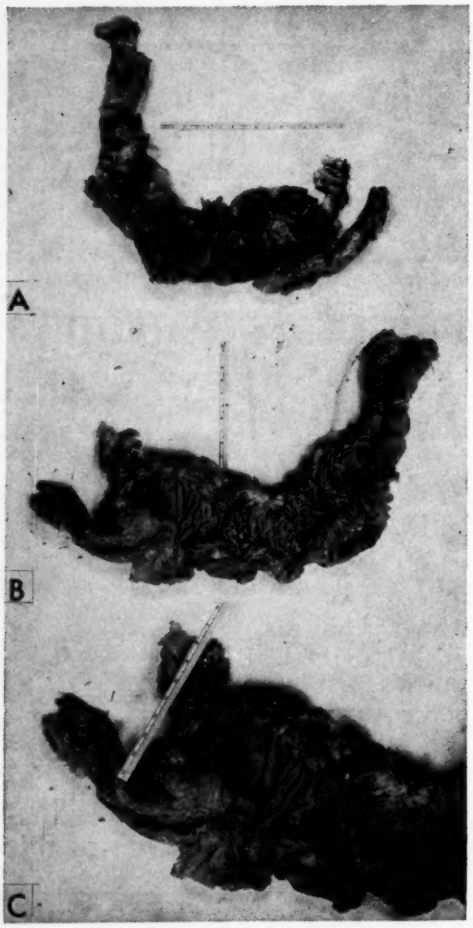

Fig. 1.—*A*, gross specimen, showing terminal portion of ileum, appendix and right half of colon. *B*, specimen opened, revealing lesion in cecum. *C*, closer view of lesion, with lymph nodes.

paper deals with Hodgkin's disease, localized in the cecum, and a case is presented in which the condition clinically resembled appendicitis.

Hess[1] in 1907 described a case of Hodgkin's granuloma in the large bowel, localized in the sigmoid flexure and the rectum, with multiple small submucous nodules, some of which were slightly eroded. There were also enlargement of the mediastinal lymph nodes, general lymphadenopathy, amyloidosis of the liver and an enlarged spleen. Histologically the lymph nodes and spleen revealed the presence of Dorothy Reed-Sternberg cells, but unfortunately there was no mention of a microscopic examination of lesions in the sigmoid or rectum. In 1913 Schlagenhaufer[2] reported the first case of microscopically proved gastrointestinal localization of Hodgkin's disease. Hayden and Apfelbach,[3] in 1927, reported the only sizable series of gastrointestinal Hodgkin's disease in which there were 26 cases of this type, although all varieties of lymphoma were included.

In recent years gastrointestinal lesions caused by Hodgkin's disease have been reported with increasing frequency. Hodgkin's disease of the gastrointestinal tract is most commonly localized in the lower part of the ileum, in the area of Peyer's patches, just proximal to the ileocecal valve.[4] Localization of Hodgkin's disease in the cecum, with or without generalized involvement of other organs, has rarely been reported.

Incidence.—A careful study of all reported cases of Hodgkin's disease of the cecum emphasizes the rarity of this location. Lame and others[5] noted that 2,090 of the malignant tumors of the stomach and 50 per cent of the malignant tumors of the small intestine in their series were lymphomas, an unusually high incidence. In none of their 22 reported cases of lymphoma, however, was the tumor localized in the cecum. Symmers[6] reported that, in a series of 173 necropsies of patients with Hodgkin's disease, not one example of involvement of the gastrointestinal tract was observed. Migliaccio and Pahigian[7] reviewed the material on gastrointestinal neoplasms over a period of twenty years. They noted 1,490 cases of adenocarcinoma and 36 cases of Hodgkin's disease, but in none of the latter was there involvement of the cecum. In a study of 174 cases of Hodgkin's disease, Jackson and Parker[8]

	Author	*Lesion*	*Symptoms*	*Comment*
1.	Pisseru (Case 1)	Infiltration of cecum	Five attacks of "appendicitis" in 2 years	Appendectomy; postoperative death
2.	Braine	Infiltration of cecum	Pain and mass in right lower quadrant of abdomen	Resection; well 4 years later
3.	Pilotelos	Infiltration of cecum	Clinical diagnosis: "Acute appendicitis"	Appendectomy; postoperative death

collected 9 cases of gastrointestinal involvement; in none of them was the condition localized in the cecum. A review of the work reported by Martin[9] on a series of 19 cases of lymphoma revealed only 1 case in which the tumor was localized in the cecum. This report is based on Mallory's classification, which does not distinguish between Hodgkin's disease, lymphogranuloma, lymphosarcoma, leukemia or aleukemia, but uses the designation "malignant lymphoma" for all these diseases. A case was reported in the French literature by Roger Ricoux[10] in which the patient had a large tumor mass in the cecum, which was resected and microscopically proved to be Hodgkin's disease. The patient was well one year after undergoing operation.

A review of the literature by Portmann, Dunne and Hazard[11] reported only 3 cases of Hodgkin's disease of the cecum (see accompanying table).

Pathogenesis.—Coronini[12] discussed the differences of opinion concerning the histogenesis of gastrointestinal Hodgkin's disease. Eberstadt[13] defended the theory that this localization results from primary nodular infiltration of the lymphoid tissue of the submucosa, which then protrudes into the lumen or invades the other layers of the bowel. Hauck,[14] Ceelen[15] and Rabinowitsch expressed the opinion that the process may reach the intestinal tract by direct extension from the involved mesentery or by retrograde lymphatic transport from the mesenteric nodes. Siegmund's detection[16] of the isolated granulomatous lesions in the submucosa supports Eberstadt's hypothesis.

Pathologic Picture.—Many of the articles dealing with this subject are difficult to appraise, because of the tendency to classify the tumors according to their histologic pattern. For example, one author will be concerned with Hodgkin's disease of the gastrointestinal tract, another with lymphomyosarcoma, still another with reticulum cell sarcoma, and so on. It is best to approach the problem by regarding the entire group as a single neoplastic entity under the heading of malignant lymphoma, to include the following types: follicular lymphocytic, reticulum cell and Hodgkin's disease. As outlined by Jackson and Parker,[17] Hodgkin's lymphoma is divisible into three subgroups: paragranuloma, granuloma and sarcoma. For the most part, however, the various individual members of this family behave clinically in much the same fashion. Furthermore, the histologic pattern of a given tumor is anything but static. Custer and Bernhard[18] and Custer[19] have shown that a significantly high percentage of lymphomas undergo a complete change in their cellular structure.

Gross Pathologic Picture.—The gross appearance is often well defined. Lymphoid tumors, in whatever part of the body they may occur, grow along lines of least resistance to an extent not observed in other malignant growths. As a result, tissues are separated along cleavage planes, thus accentuating different structures, such as mucosa, submucosa, and muscularis, and producing fairly uniform,

diffuse enlargement of the part invaded. It is only later, when the growth is more exuberant and normal barriers have been broken down by pressure of the proliferating tumor cells, that structures are obliterated and necrosis occurs. Two main types of growth are observed in lymphoid tumors of the gastrointestinal tract: (1) a diffuse growth involving a part of an organ, and causing fairly uniform, diffuse thickening, sometimes with discrete tumors here and there, with or without ulceration, and (2) a large solitary tumor, usually with deep ulceration or, rather, cavitation. Rarely, polypoid forms of the tumor are seen.

The serosa is not invaded or distorted by lymphoid tumor except in rare cases when the tumor is very large. An extensive tumor that does not greatly distort the organ or involve the serosa is very likely to be of the lymphoid type.

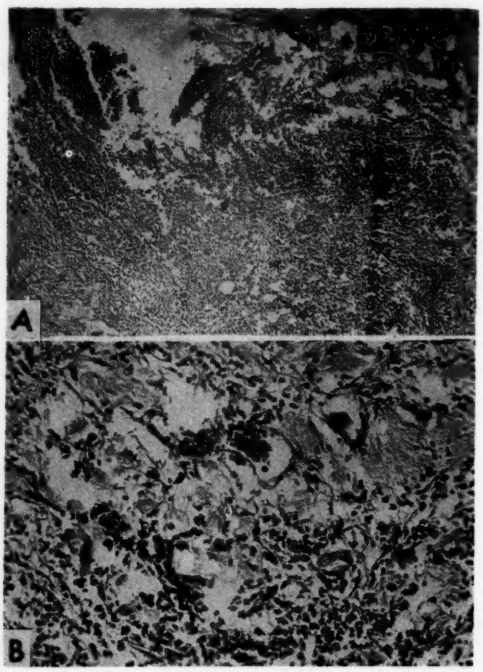

Fig. 3.—*A*, ulceration into submucosa and muscularis of colon. *B*, Reed-Sternberg cells visible below submucosa.

Fig. 2.—Microscopic section, showing colonic mucosa at end of lesion.

Lymphoid tumors usually are succulent and more resilient than most carcinomas, although Hodgkin's disease may present a very firm, fibrous structure. The tumors are rarely recognized when they are small, and when first observed are usually much larger than carcinomas.

Other lesions having gross features in common with lymphoid tumors are diffuse carcinoma simplex; leiomyoma and leiomyosarcoma, and a diffuse inflammatory change such as cicatrizing enteritis. Diffuse carcinoma simplex, fairly commonly observed in the stomach but rare in other parts of the intestinal tract, may cause a uniform thickening of the wall, separating without distorting the structural units in a similar manner, with the difference that

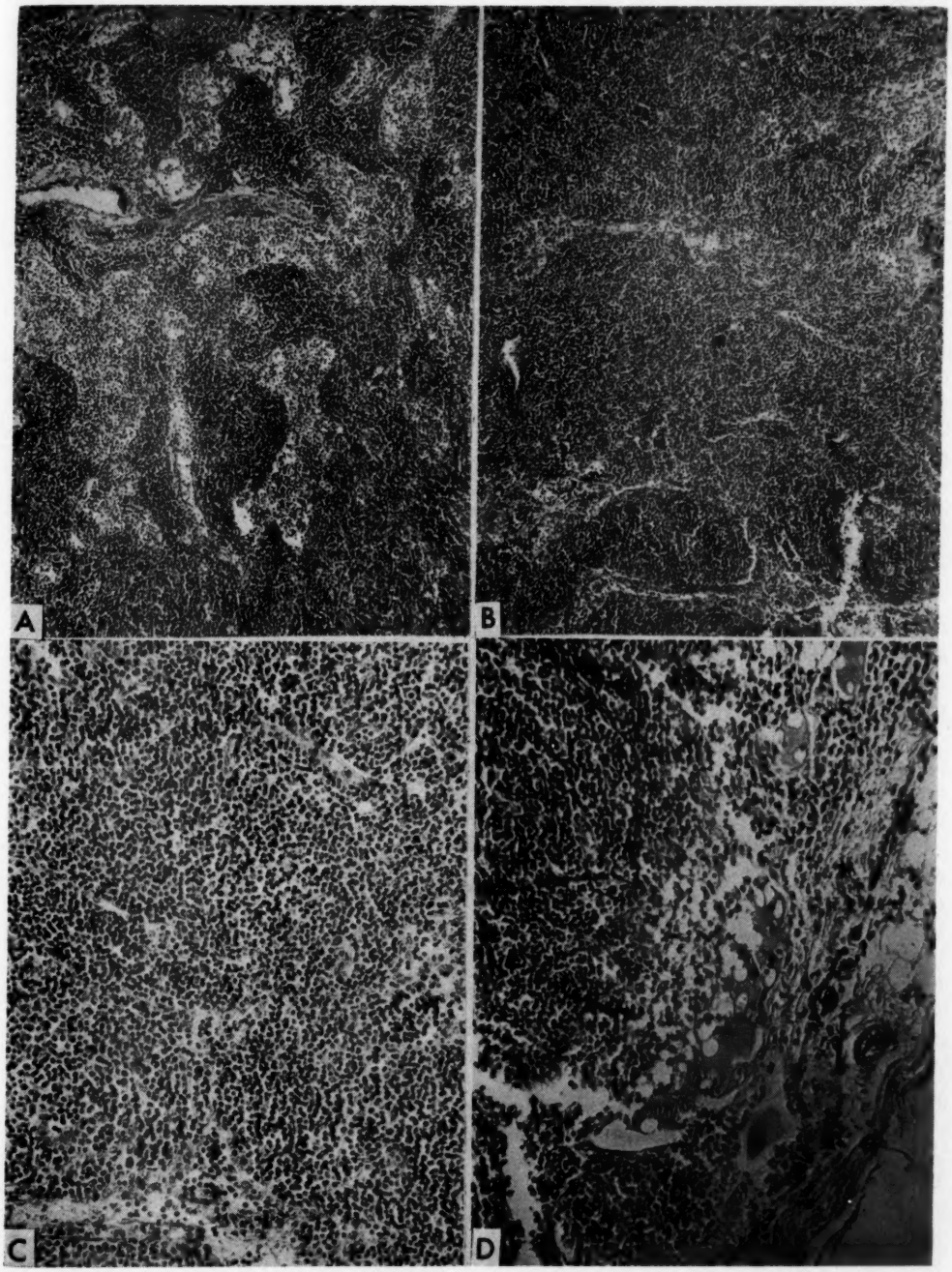

Fig. 4.—*A*, mesenteric lymph node showing involvement. *B*, caseoid necrosis of mesenteric lymph node. *C*, normal mesenteric lymph node with infiltration of eosinophils. *D*, section of appendix with no involvement in disease. Plasma cells are prevalent.

this type of carcinoma produces a rigid, contrasted organ and is frequently mucus-secreting.

Most inflammatory conditions are easily distinguished from lymphoid tumors, but cicatrizing enteritis (regional enteritis) may cause diffuse uniform thickening without loss of structure.

A large, globular lymphoid tumor may resemble leiomyoma or leiomyosarcoma. The benign and malignant forms of smooth muscle tumors are rarely encountered in the gastrointestinal tract, but are somewhat more common in the stomach than elsewhere. Such a tumor usually presents as a discrete, rounded, resilient mass, either intrinsic in the wall or pedunculated toward the mucous or serous surface. Even when the histologic structure is fairly suggestive of a malignant tumor, the growth tends to be delineated rather than invasive. Necrosis, ulceration and rapid growth are the usual signs of malignancy. Lymphoid tumors, though expansive, do not often become pedunculated.

It is important to determine whether or not the tumor is part of a generalized disease. This problem is more important with the small bowel, where secondary, lymphoid tumors are more commonly observed. The most helpful consideration is the infrequency of secondary tumors in the small bowel without large metastases in either the mesenteric or the retroperitoneal lymph nodes. Secondary lymphoid tumors are less common in the stomach and large bowel and practically never reach the size of the usual primary lymphoid tumor.

Age and Sex Incidence.—Just as in the case of its commoner localizations, Hodgkin's disease of the cecum occurs chiefly in the third decade of life (20 to 29 years of age).[20] The frequency is the same in men as in women.[21]

Signs and Symptoms.—The clinical picture of Hodgkin's disease of the cecum is characterized by dull, constant pain in the right lower quadrant of the abdomen, associated with anorexia, nausea and slight loss of weight.

According to Spellberg and Zivin,[11] obstructive symptoms are absent. Anorexia and epigastric distress, however, are usually prominent; aching in the right lower quadrant of the abdomen is often severe.

Neither hematemesis nor melena is usual or frequent in reported cases. Anemia and diarrhea are rarely associated with Hodgkin's disease, in contrast to carcinoma in this area. Most authors agree that in the presence of lymphoma anemia is uncommon, even rare; if present, it is very slight.[22] Loss of energy is slight to moderate. As the disease progresses, the pain becomes more severe and a palpable mass is usually present, possibly with acute or chronic peritonitis.

Prognosis.—Minot and Isaac,[23] in their analysis of a large group of lymphomas, concluded that the duration of life was longer in the patients with symptoms referable to the gastrointestinal tract. In contrast, Craver and Herrmann[24] found that life expectancy was short (nine to twelve months) when the initial lesions of Hodgkin's disease were localized in the gastrointestinal tract.

The observation by Minot and Isaac can perhaps be explained by the observation that gastrointestinal complications of Hodgkin's disease usually develop in the later stages, i.e., in patients who have had the disease for several years. It has been brought out[25] that, even if the retroperitoneal lymph nodes are involved early in the disease, symptoms and signs will develop only in the later stages. For a long time the abdominal organs are able to adjust to the space-occupying masses. Only when the viscera can no longer accommodate themselves to the enlargement of the masses will pressure symptoms arise.

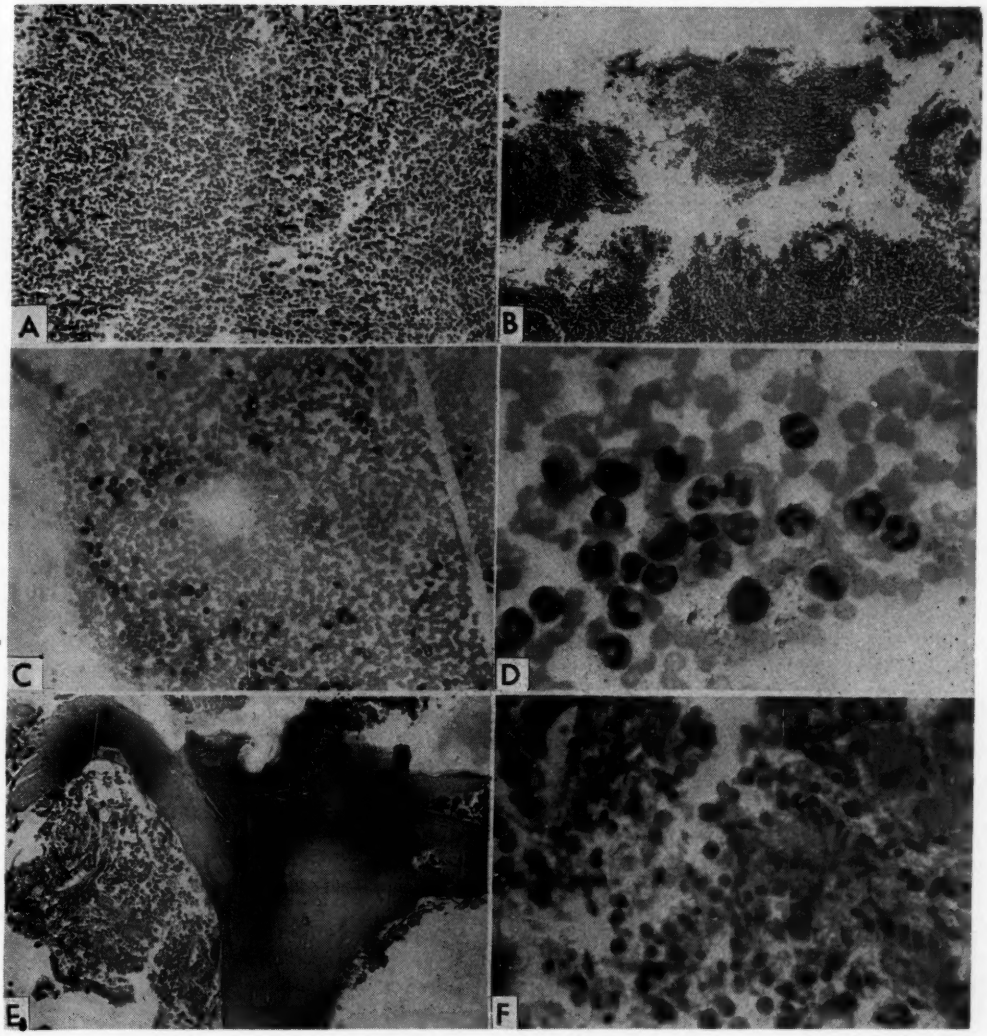

Fig. 5.—*A*, microscopic section of inguinal lymph node, showing no evidence of Hodgkin's disease. *B*, photomicrograph indicating no obliteration of architecture of lymph nodes. *C*, smear from aspirated bone marrow, essentially normal. *D*, photomicrograph showing normal megakaryocytes; no evidence of tumor. *E*, biopsy specimen of bone marrow, apparently normal. *F*, photomicrograph showing absence of any evidence of tumor cells on microscopic examination.

Hence the obstructive syndrome is a late manifestation and arises only in those patients who live long enough for it to develop. Warren and Lulenski[26] reported that the average duration of life in cases of primary lymphoblastoma of the gastrointestinal tract is two and one-half years, as compared to the three-year survival reported by Madding and Walters.[27]

Therapy.—Nitrogen mustard and irradiation do not change the ultimate outlook of the disease, but they will often relieve the patient for more or less prolonged periods. When these methods are applied

for the first time, the results may seem little short of miraculous. At subsequent series of treatment the disease becomes more and more resistant. Investigators[28] who have vast experience in the treatment of Hodgkin's disease consider roentgen therapy most effective in the localized form of the condition, and nitrogen mustard therapy the method of choice in instances of generalized adenopathy.

Sussig[29] and Singer[30] have advocated surgical resection combined with roentgen therapy for localized Hodgkin's disease of the gastrointestinal tract. When the lesions are inoperable or surgical intervention is contraindicated, roentgen therapy is advocated for the amelioration of symptoms and the prolongation of life.

According to Levinson, Walter Cartwright, and Wintrobe,[31] their data do not support the impression that early roentgen or mechlorethamine hydrochloride therapy prolongs the life of a patient with Hodgkin's disease.

Widmann[32] has expressed the opinion that, in cases of Hodgkin's disease localized to the cecum, in which resection has been done, roentgen therapy should not be used.

REPORT OF CASE

S. D., a 23-year-old white man, an automobile mechanic, was admitted to the hospital on July 14, 1958, complaining of pain in the right lower quadrant of the abdomen, associated with nausea but no vomiting of one day's duration.

The patient had last felt perfectly well up to two weeks before admission, when he was first seized with pain in the right lower quadrant of the abdomen, accompanied by nausea and vomiting. He did not think the attack important or severe enough to seek medical advice, and took some sodium bicarbonate at home. On the following day the nausea and vomiting cleared up; but some residual pain in the right lower abdominal quadrant persisted for the next two days, then gradually disappeared. The patient did not stay at home from work during his attack of abdominal pain.

On the morning of admission to the hospital he felt nauseated after having eaten breakfast, and had severe continuous pain in the right lower abdominal quadrant, with no radiation. He decided to see a physician at once and was referred to me.

The past medical history was irrelevant except for whooping cough in childhood. The patient had had no previous operation, loss of weight or contagious diseases. His mother and father were living and well; two brothers and three sisters were living and well. The patient was not married and used no alcohol; he took no drugs and smoked only moderately. A systemic review was not informative.

Physical examination showed the patient to be well developed, with no abnormalities except for the abdomen. Marked tenderness and some muscle guarding were elicited over McBurney's point. The only masses palpable were two nontender, freely movable lymph nodes just below the middle third of the inguinal ligament on the right. The spleen and liver were not palpable. Rectal examination elicited a great deal of tenderness in the right side of the pelvis, but no masses were detected by palpation. The prostate was normal in size and contour.

The temperature was 99 F. The pulse rate was 90 and the respiratory rate 20. The blood pressure in millimeters of mercury was 124 systolic and 80 diastolic.

Laboratory studies showed a hemoglobin level of 12.3 Gm. per hundred cubic centimeters. The erythrocyte count was 4,000,000 per cubic millimeter of blood and the hematocrit reading 42 per cent. The leukocyte count was 10,300 per cubic millimeter, with 82 per cent segmented neutrophils, 15 per cent lymphocytes, 1 per cent monocytes and 2 per cent eosinophils. Urinalysis and serologic studies of the blood gave negative results.

It was my clinical impression the patient had appendicitis, and operation was performed on the morning of admission. With the region under spinal anesthesia, a McBurney muscle-splitting incision was made, and the appendix was free in the pelvis and perfectly normal. Exploration of the terminal ileum and mesentery revealed no abnormality. The cecum contained a hard, firmly fixed mass, posteriorly situated and about the size of an orange, which was thought to be a carcinoma. The serosa was edematous and injected.

In view of the fact this lesion was considered malignant and a right hemicolectomy was

necessary, the appendix was not removed; the incision was closed in layers. The patient was prepared for right colectomy with sulfasuxidine for three days and neomycin twenty-four hours before the operation. Castor oil, 1½ ounces, was given initially to clean out the bowel and was followed by daily enemas. Sigmoidoscopic examination before colectomy revealed no abnormality.

The patient was reoperated on, with a preoperative diagnosis of carcinoma of the cecum. The abdomen was opened through a lower right rectus incision, and exploration revealed normal conditions throughout except for the hard, fixed mass in the head of the cecum, previously described. The edema and injection of the serosa over the cecum extended to a distance of about 6 cm. Just below and medial to the cecal mass were two firm and discrete lymph nodes, each about the size of an almond. No other nodes were seen or palpated in the abdomen; the liver was normal in size, color and contour, as well as to palpation.

The terminal portion of the ileum, cecum, and ascending colon to the midtransverse portion of the colon were resected, and an end-to-side ileotransverse colostomy was performed.

The abdomen was about to be closed when suddenly the patient went into cardiac arrest. No peripheral pulse or blood pressure could be obtained by the anesthesiologist, and I could feel no pulsation in the abdominal portion of the aorta. Immediately the left side of the chest was opened and cardiac massage performed. A few massages gave no response, and then the pericardium was opened; the myocardium was grasped and massaged several times. The pulse appeared gradually as the heart resumed its own rhythm, and the blood pressure was maintained with twenty-five minutes of massage. The pericardium, the chest and the abdomen were closed simultaneously; the patient had a good pulse rate (85) and a blood pressure of 100 systolic and 80 diastolic when he left the operating room.

The immediate postoperative period was excellent in that the patient responded well, showing good cerebral function. His course continued to be good, and ambulation was permitted on the third day. There was spontaneous bowel movement on the fourth postoperative day, and the patient was taking food well by mouth.

The pathologic report was as follows:

"*Gross:* The specimen consists of: 40 cm. of colon and 11 cm. of ileum.[1] There is an ulcerated 4.5 cm. lesion arising at the root of the appendix, with firm elevated margins. The base consists of necrotic green material.[2] The wall of the colon at the site of the lesion is infiltrated by firm grey tissue that penetrates the serosa. At this point[3] numerous large, firm grey lymph nodes are present. The resected margins appear grossly free of tumor.

"*Microscopic:* Sections taken through the colonic lesion demonstrate a large ulcerative lesion of the colon, with the colonic mucosa ending abruptly at the margin of the ulcer.[4] The mucosa does not exhibit any metaplastic change. The ulcer is layered with necrotic débris and colonies of bacteria. There is a dense cellular infiltrate in the submucosa, penetrating into the muscularis.[5] This infiltrate consists of large cells with scanty eosinophilic cytoplasm but showing large and bizarre nuclei with prominent red nuclei. Between these cells there are many eosinophils and plasma cells. Occasionally a Reed-Sternberg cell is detectable.[6] Two out of seven regional lymph nodes are involved. Here the tumor exhibits marked caseoid necrosis.[33] The normal lymph nodes demonstrate no alteration in their pattern, but numerous eosinophils are identifiable within their sinusoids.[8] The appendiceal wall is thickened and exhibits serosal fibrosis; its muscularis is infiltrated by plasma cells, lymphocytes and eosinophilic polymorphonuclear leukocytes.[9] The resected margins appear normal.

"*Diagnosis:* Hodgkin's disease involving the cecum and two out of seven regional lymph nodes. The resected margins are free of tumor."[9]

In view of the fact this patient had Hodgkin's disease of the cecum, he was carefully studied for systemic evidence of the disease.

Two thoracic roentgen examinations, one week apart, after the operation showed no evidence of the disease; the mediastium was normal.

The two small lymph nodes observed below the right inguinal ligament at the original physical examination were removed for biopsy, and gave negative results for Hodgkin's disease, as here reported:

"*Gross:* The specimen consists of a lymph node measuring 0.6 by 0.3 by 0.2 cm. It is firm grey-tan. It was sectioned *in toto.*

"*Microscopic:* Microscopic section of the lymph node demonstrates an intact capsule.[10] There are focal areas of fibrosis with a minimal hyperplasia of the reticuloendothelial cells.

There is no obliteration of the lymph nodal architecture.[11]

"Diagnosis: Reticuloendothelial hyperplasia of the lymph nodes with focal fibrosis. There is no evidence of neoplasia."[12]

Aspiration of the bone marrow was done and revealed normal conditions:

"Microscopic: Microscopic examination of the smear made from a bone marrow aspirate and stained with Wright's stain demonstrate the red cells to be normal. Scattered megakaryocytes are seen, and these appear to be normal.[13] Developing cells of the myeloid and erythroid series are sparse, owing to the marked dilution present. Those that are seen appear cytologically normal. Good maturation is evident. No evidence of tumor cells is seen.[13]

"Diagnosis: Diluted bone marrow aspiration inadequate for diagnosis. No tumor cells are seen."

Further bone marrow studies were performed and a marrow biopsy was done, with the following results:

"Gross: The specimen consists of two cylindric fragments of firm white tissue measuring 0.2 by 0.1 cm. each. It is sectioned *in toto.*

"Microscopic: Microscopic sections demonstrate bony trabeculi, which appear normal.[14] The red marrow is cellular, and numerous megakaryocytes are observed. The marrow is pleomorphic and consists of maturing cells, both red and white, without evidence of tumor cells.[15]

"Diagnosis: Normal bone and red marrow."

A hematologist was brought in consultation to appraise the patient's condition further. His report was as follows:

"The patient said he felt well and had no complaints. There was moderate pallor of the mucous membranes. The tongue was smooth, and a few very small lymph nodes could be palpated in the right groin and the left axilla. There was no other significant lymphadenopathy or organ enlargement elsewhere.

"A review of the histologic slides of the colonic tumor removed at the operation confirmed the diagnosis of Hodgkin's lymphoma involving the immediately adjacent mesenteric lymph nodes. The bone marrow disclosed only hyperplasia of leukopoietic tissue. Except for slight anemia and leukocytosis, no abnormalities were observed in the blood.

"Examination of the x-ray studies of the chest done before and after the operation do not reveal any clear evidence of lymphomatous disease.

"The central question at present is whether or not this man should be treated now. It seems to me, since the surgical exploration revealed no other areas involved by the tumor, and other examinations also failed to support the existence of the tumor elsewhere, that it would be best not to treat the patient but to keep him under surveillance for the next six months. This would mean visits to the physician once a month for appraisal of his condition and decision as to whether or not the treatment is justified. It may well be that much, if not all, of the lesion was removed surgically, in which case the remission should be lasting."

The pathologic slides were sent for consultation to the Armed Forces Institute of Pathology, Washington, D.C., where a diagnosis of reticulum cell sarcoma was made. This brings out a point discussed earlier in this article, i.e., that Hodgkin's disease and reticulum sarcoma are different phases of the same disease called malignant lymphoma.

Dr. Arthur Purdy Stout of Columbia University, New York City, New York, was a consultant in reading the slides and stated that they revealed Hodgkin's disease.

The patient was discharged from the hospital ten days after the operation, with both wounds of the chest and abdomen well healed. He had an excellent appetite. His mental status was the same as before the operation.

Owing to the fact that the diagnosis was localized Hodgkin's disease of the cecum, with no systemic involvement, no roentgen therapy was instituted, either in the hospital or since the discharge of the patient.

Subsequent follow-up of the patient in my office showed steady, good recovery from the operation. At the time of writing he has gained 9 pounds (4.1 Kg.) since he left the hospital. His appetite continues to be excellent. The incisions are firmly healed. There is no evidence of peripheral lymphadenopathy or other signs of Hodgkin's disease.

The patient has recently returned to work and offers no complaints.

ZUSAMMENFASSUNG

Die Hodgkinsche Krankheit kann im Magendarmkanal auftreten.

Es wird ein Ueberblick ueber die Literatur ueber Hodgkinsche Krankheit des

Magendarmkanals besonders des Zoekums gegeben.

Es wird ueber einen Fall berichtet, bei dem die primaeren Krankheitszeichen im Zoekum auftraten und klinisch eine Aehnlichkeit mit Blinddarmentzuendung bestand.

Die primaere Hodgkinsche Erkrankung des Zoekums ist selten und kann auf dem Operationstisch leicht mit einem Krebs verwechselt werden.

RESUMEN

La enfermedad de Hodgkin puede manifestarse en el tracto gastrointestinal. En este trabajo se pasa revista a la literatura sobre el Hodgkin y el aparato digestivo. Se trata sobre un caso de Hodgkin del ciego que clínicamente parecía una apendicitis. La enfermedad de Hodgkin primaria del ciego es rara y a primera vista puede ser confundida en la mesa de operaciones con un carcinoma.

RÉSUMÉ

La maladie de Hodgkin peut se manifester dans le tube digestif.

La littérature publiée à ce sujet—particulièrement en ce qui concerne le caecum—est analysée.

L'auteur décrit un cas ayant simulé une appendicite, où les premiers symptômes de l'affection avaient pour siège le caecum.

La localisation primaire au caecum de la maladie de Hodgkin est rare, et elle peut être grossièrement confondue, à l'opération, avec un carcinome.

SUMARIO

Diz que podem haver manifestações da molestia de Hodgkin no trato gastro-intestinal, fazendo então uma revisão da literatura especialmente de relação ao cecum.

Refere um caso em que essa localisação simulou a apendicite. A molestia de Hodgkin no cecum é rara mas pode ser gresseiramente confundida na mesa operatoria com o carcinoma.

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Significant proof of the close relationship existing between historical events and the progress of medicine is contained in the ancient secular terror at touching dead bodies, not to mention performing autopsies. That terror, increased by the religious persecution of those who dared to defy the prohibition against dissection of corpses, retarded the progress of anatomy and medicine, which were limited to animal dissection for thousands of years. Later, when impatient anatomists clandestinely used corpses dug up from cemeteries, autopsies were carried out with great caution, often several days after death, when autolysis had already transformed the adrenal medulla into a dark viscous liquid (*atrabilis*) contained within the cortex. Hence, it was thought that the adrenals were capsules (*capsulae suprarenale*) full of liquid, which testifies to the close tie existing between the historical *ambiance* of each period and the evolution of medicine. A religious taboo retarded the knowledge of the anatomic structure of the adrenal glands for hundreds of years!

—*Marti-Ibañez*

The Surgical Treatment of Peptic Ulcer: Evolutionary Progress

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The evolution of treatment for peptic ulcer is discussed. Either perforation or recurrent obstruction requires surgical intervention. With regard to perforation, the author approaches the problem from the point of view of simple closure versus resection.

Vagotomy routinely accompanying gastrectomy is also discussed, with emphasis on its special value in cases of inflammatory duodenal ulcer and in the presence of a poor nutritional state, excessive nocturnal secretion and a high acid level.

For gastrojejunal ulcer associated with gastroenterostomy and gastric resection, the author recommends resection for the former and vagotomy for the latter. Replacement of a portion of the stomach with transplant from the colon or the small intestine has both merits and drawbacks. It is not advisable in the treatment of duodenal ulcer.

THE surgical treatment of lesions of the stomach and duodenum has been one of progressive change, an evolutionary process. Most surgeons a quarter of a century ago were supporting the procedure of posterior gastroenterostomy as the operation of choice in the treatment of peptic ulcer. Finney and Hanrahan,[1] Judd and Hazeltine,[2] Horsley[3] and others, however, were impressed with the results obtained by pyloroplasty. It was frequently employed by many surgeons.

Partial gastrectomy for duodenal ulcer was primarily initiated in Germany and Austria. It was used in preference to gastroenterostomy because fewer recurrent or stomal ulcers occurred.

A few bold surgeons in the United States adopted this procedure and demonstrated a lower incidence of recurrent ulceration after resection than had been observed after gastroenterostomy. Pioneers in this field of partial gastrectomy were Berg,[4] Lewisohn[5] and Strauss[6] and their associates. Objections were widespread against the removal of so large a portion of the stomach for a small gastric or duodenal ulcer. Also, when a gastrojejunal ulcer did occur after resection, it was much more difficult to approach surgically than after gastroenterostomy, and it required removal of still more of the stomach. With the improvement of surgical technic, better understanding and appraisal of the surgical risk, proper preparation of the patient for operation and increasing experience with partial gastrectomy for ulcer, the operative mortality rate has steadily declined, until now it is at a near minimum of 1 to 2 per cent.

It soon became apparent, after experience and the comparison of results, that resection was preferable to gastroenterostomy and that recurrent ulceration was less frequent. The functional results were

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satisfactory. This was evidenced by patients who, then as today, after years of medical treatment for ulcer, were restored to gastric comfort and an entirely new way of life by partial gastric resection. These patients report repeatedly that they regret not having submitted to the operation years ago. Comfort had been attained only by gastric resection. Serious complications, as compared to years of medical disappointment, have been so infrequent as to be no potent influence against the operation.

Vagotomy as revised and popularized by Dragstedt[7] has much merit and is the procedure of choice in many instances. Some surgeons advocate vagotomy with all gastrectomies; while in the opinion of others, radical gastrectomy is adequate and vagotomy has its place, but not as a routine procedure in the surgical approach to duodenal ulcer. This I shall discuss later, because I am convinced that there are definite indications for vagotomy. If one desires it to be a routine associated procedure, I will not dissent. It is only by these different approaches that there will ultimately be a standardized procedure for and against associated vagotomy. Suffice it to say that no longer is gastroenterostomy or pyloroplasty a source of contention; the inclusion of vagotomy is the controversial issue. Partial gastric resection, with or without vagotomy, results in the lowest incidence of recurrence and the minimum of undesirable postoperative sequelae.

Replacement surgical measures are experimental. They offer some advantage to the patient with the postgastrectomy syndrome but are associated with an increased incidence of recurrent ulcer. Such a procedure is not an operation of primary choice and is rarely desirable in the presence of postgastrectomy complications.

Perforating Peptic Ulcer.—The diagnosis of perforation is usually easy to make. If it is not confirmed by roentgen evidence of free air in the peritoneal cavity, acute pancreatitis must be considered. Many of the symptoms are similar, and the presence of a high blood amylase level does not confirm the diagnosis of acute pancreatitis or exclude perforation. The patient with perforated ulcer may have a high blood amylase level because of peritoneal absorption of escaped duodenal enzymes.

Air in large quantities injected into the stomach through a nasal tube may depict pneumoperitoneum on the roentgenogram if perforation is present and was not observed on the initial film. If no air is detected by this method, there is no free perforation and immediate operation is not indicated. This procedure can do no harm. I have used it several times as a differential diagnostic agent.

Nearly all medical men consider perforation of gastric or duodenal ulcer a surgical emergency. When perforation occurs in association with either of these ulcers, an escape of gas and an outpouring of the contents of the viscus take place. Contamination occurs, and serious infection may ensue. Some perforations are so slight that they may be spontaneously sealed with omentum or surrounding tissues. This has been repeatedly demonstrated at abdominal exploration. Only slight contamination and little or no infection of consequence occurs in these sealed perforations. Clinically the symptoms are slight and usually unrecognized. When perforation is clinically apparent, I advise surgical exploration rather than gastric drainage and a medical regimen.

The problem of closure versus resection is controversial and, from my point of view, is related to whether the lesion is gastric or duodenal, obstructive or previously associated with hemorrhage.

A perforating gastric ulcer should usually be resected at the time of exploration, because of the uncertainty of its histologic

nature. No means other than microscopic section is available to determine the cytologic structure of the ulcer; and since at least 10 per cent of gastric ulcerative lesions are malignant, resection rather than simple closure is advised.

This was dramatically demonstrated to me more than twenty years ago when I closed a supposedly benign perforation of a gastric ulcer in a man 39 years old, only to have him return six months later with an unresectable carcinoma of the stomach.

Perforation of a duodenal ulcer into the abdominal cavity may require simple closure, or certain conditions may indicate subtotal gastric resection. When there is no sign of obstruction, when the ulcer is not chronic, is not extensively indurated near the pylorus, has not been intractable to medical management and has not bled, the ulcer, in my opinion, should be simply closed. Drainage should be employed if the duration of the perforation and abdominal contamination indicate it. When in doubt, drain; it can do no harm. A perforation without induration or evidence of chronicity may remain symptomless after closure. Each case must be individualized. Some prominent surgeons have for years resected such lesions, in most instances at the time of operation for perforation. I do, under the aforementioned conditions.

Massive Hemorrhage from Ulcer.—Massive hemorrhage is one of the major complications of peptic ulcer, and the decision to continue medical treatment or institute surgical intervention is hard to make. The medical and surgical points of view are often at divergent extremes. There must be a happy medium based upon the age of the patient, the degree of obvious arterial sclerosis, the patient's past history as to repeated hemorrhages and the response to a limited number of blood transfusions at the time of hemorrhage. Many papers have been written on this subject, but no plan has been presented in which a definite criterion would indicate immediate operation. The decision for operation is never an easy one to make. The tendency is, too often, to defer operation until vascular collapse has become a problem of great magnitude.

I am convinced that in the presence of massive hemorrhage from peptic ulcer, when circulatory balance is not restored after transfusions of 4 to 5 units of blood, the patient is still bleeding and operation should be performed at once. I have never regretted this approach, and, since some basis for action should be established, I consider this a workable plan.

Since most of the patients in these cases are seen first by the medical consultant, surgical advice should be promptly sought, and an unbiased cooperative appraisal should be the basis of therapeutic action. I agree that bleeding often ceases spontaneously and that many patients recover without operation. It is therefore hard to determine the procedure to follow in the individual case. I recognize, however, that the problem is real and that many patients die of massive hemorrhage from peptic ulcer who could have been saved by a timely operation. I would not consider operation for all patients with bleeding ulcer, nor would I condone medical management for all of them. Each case must be medically and surgically evaluated. I consider it better to err on the side of operation to stop the bleeding. I know from many experiences that these patients stand surgical intervention remarkably well and that as soon as the bleeding is controlled the patient, who is in vascular collapse, will regain circulatory balance and a sustained blood pressure through transfusion support. I advocate surgical interruption of the bleeding and expect good results even for those cold, pulseless patients with no blood pressure who are in extreme vascular col-

lapse from hemorrhage. No other procedure is effective. The results well reward the surgeon for his courage and determined action. I often wonder why one ponders the wisdom of operation in these cases of serious hemorrhage, when no such delay is considered in other and similar surgical emergencies.

Intractable Ulcer.—Intractable ulcer is a penetrating ulcer, usually on the posterior wall of the stomach or duodenum, which, because of induration, fibrosis, vascular occlusion and crater formation, is not likely to heal with any permanent degree of security under medical management. The lesion is comparable to a varicose ulcer of the leg, which heals with thin, poorly vascularized epithelium. The blood supply is so poor that a well-nourished granulation bed filling the exposed crater is impossible, and nutrition is insufficient to promote permanent healing; hence an early breakdown is to be expected. In the surgeon's opinion, because of penetration, crater formation and insufficient blood supply for a granulating base, adequate epithelization will not result and healing will not be permanent. A patient with such an ulcer cannot carry on his normal activities, is intractable to medical management and should be operated upon.

Physicians state that these ulcers are not intractable; it is only the doctor or the patient who is intractable. They maintain that comfort can be obtained by medical measures and that the ulcers will heal. How many persons afflicted with such an ulcer can afford to consent to the required bed rest, diet and medical treatment? How long can a patient maintain a good nutritional status under such a protracted regimen? How can he retain his economic responsibility, and just how long would his zeal for such a restricted life continue?

With resection, a high degree of postoperative gastric comfort can be expected, which is far more than can be obtained over a long period by medical treatment. The occasional unsatisfactory result after operation is in no way comparable to the uncertainty of long years of protracted medical management.

Pyloric Obstruction, Chronic and Recurrent.—Chronic pyloric obstruction is the end result of a long-standing, progressively fibrotic constriction of the outlet of the stomach by ulceration. Some operation must be performed to provide an outlet for the passage of food if life is to be sustained. The choice of procedure is, in my opinion, dependent on the age of the patient and the acid values of the gastric contents.

For patients of advanced years with a relatively short life expectancy and low acid values there is no better operation than posterior gastroenterostomy, with or without vagotomy (preferably without). If the patient has a long life expectancy and the acid values are high, gastric resection is preferable. An accompanying vagotomy is a matter of individual preference. The ulcer is chronic; it has long since run its course, and the gastric values are usually not high enough to indicate an associated vagotomy.

Recurrent obstruction is preliminary to chronic obstruction. In all chronic fibrotic obstructions there have been previous episodes of this nature. Many patients with an ulcer near the pylorus get along fairly well under restricted activity and dietary precautions. They cannot, however, under normal activity escape periodic attacks of pyloric obstruction from recurrent edema and activation of the ulcer. I am therefore convinced that gastric resection should be advised after two or three trials of adequate medical management have failed to permit the patient to earn his livelihood in the way for which he is prepared without recurring obstruction and discomfort.

Carcinoma and Gastric Ulcer.—Much has been written about the relationship of acute gastric ulcer to malignant disease. There is no accurate way to make a differential diagnosis, and he who treats a gastric ulcer for a protracted period of time without the realization that he may be dealing with a malignant ulcer is assuming a grave responsibility. There is no way of making an accurate diagnosis. The "brush cytology" method is excellent if the results are positive but is of no value if they are negative. Response to treatment, the acid values of the gastric secretion, the diameter of the ulcer crater as seen by roentgen study and the radiologic indications of healing have not proved infallible. Even the gross appearance of the lesion after removal of multiple frozen sections at the operating table is often inaccurate. The location of the ulcer is of some value. Ulcers on the greater curvature are more frequently malignant than are ulcers elsewhere. Those on the lesser curvature are less likely to be malignant than those in the prepyloric region of the stomach. Certainly there is a diagnostic error, associated with all known methods of differential diagnosis, of at least 10 per cent. My own is 11 per cent, and many have reported a much higher percentage.

Notable authorities, e.g., Welch and Allen,[8] Marshall,[9] Ravdin and Horn,[10] Strode[11] and others have confirmed the high percentage of error in the preoperative diagnosis between benignity and malignancy in gastric ulcer.

Removal of Ulcer.—Most ulcers can be surgically removed even when they are low, indurated and close to the common bile duct. Any attempt to resect a duodenal ulcer should in all instances be accompanied with exposure of the common bile duct. This enables me to appraise its relation to the indurated ulcer and to estimate the ability to close the duodenal stump securely after resection. Experience with a large group of posterior penetrating duodenal ulcers, therefore, has convinced me that the ulcer can usually be removed. I disapprove of the exclusion operation. I consider it unwise to leave the ulcer when it is possible to remove it. Although excluded from the erosive effects of the gastric juice, many ulcers may not heal or remain healed, as is evidenced by subsequent bleeding. I have always advocated removal of the pathologic condition when possible.

Gastrojejunal Ulcer.—When gastroenterostomy has been performed as a sole procedure and stomal ulcer develops, it is not sufficient to disconnect the gastroenterostomy and restore gastroduodenal continuity. Recurrence of the old duodenal ulcer will occur in 50 per cent of cases and in 60 per cent if pyloroplasty is performed, as reported by Walters.[12]

When stomal ulcer develops in association with gastroenterostomy, the bypass should be disconnected and subtotal gastric resection performed. When recurrence has developed after subtotal gastrectomy, as has been mentioned under the discussion of vagotomy, a vagotomy should be done if no obstruction is present. The remainder of the stomach should be preserved if possible. Additional resection should be undertaken only in the presence of an obstructive jejunal ulcer. If vagotomy is not successful, further resection can be performed subsequently.

Vagotomy.—The cephalic phase of duodenal ulcer and the complications of stomal ulcer after resection represent the two types of ulcer in which vagotomy is most useful.

The gastric phase, accompanied with high gastric acidity, is best controlled through lowering the gastric acid by a high subtotal gastrectomy. Vagotomy is not essential. It is my policy to perform vagotomy in all cases in which there is

a recurrent stomal ulcer without obstruction rather than perform another resection if the primary resection was adequate. Secondary resection can always be carried out, and I prefer to conserve what remains of the stomach if possible. My results have been good. The value of vagotomy and gastroenterostomy depends on the period of time after operation. Walters[12] reported unfavorable results in 141 patients subjected to this procedure. Seventy per cent showed good results, 25 per cent satisfactory results, and 5 per cent had recurrent ulcers in a follow-up study over two to eight years; with the passage of further time the results were progressively poorer because of the more frequent occurrence of gastrojejunal ulcer (about 7 per cent). The frequency of recurring ulcer after radical partial gastrectomy has been about 2 to 3 per cent.

Vagotomy with posterior gastroenterostomy is the operation of choice when a patient is thin and a poor eater. A patient with this nutritional deficiency will never gain weight after resection. It is also a wise procedure in a case of duodenal ulcer associated with much edema and inflammatory reaction when it is apparent that closure of the duodenal stump might be insecure. A large amount of night secretion with high acid values indicates vagotomy associated with high gastric resection.

Dumping Syndrome.—The dumping syndrome is an objection to partial gastrectomy for peptic ulcer and is constantly presented as an argument against operation. It usually occurs during a meal or shortly thereafter. It is associated with weakness, pallor, often sweating and sometimes nausea and vomiting. In my experience it has not been a complication associated with any great degree of disability. A faint weakness is sometimes complained of; rarely is it disabling or permanent.

Presumptive theories concerning the origin of this condition are based upon the rather abrupt mechanical distention of the jejunal loop by the sudden dumping of the stomach contents into it—a solar plexus response.

It is my conviction that too large a gastrojejunal stoma, the chemical factor of undiluted hypertonic fluid being delivered rapidly in volume into the jejunum, resulting in the elevation of the blood sugar to a high level followed by a hypoglycemic reaction, is an important factor. It is therefore a hyperglycemic phase, followed eventually by a hypoglycemic one. The type of operation has a great deal to do with it. I have not been bothered much with it, since I perform the Hofmeister anticolic type of anastomosis and buttress the distal limb of the jejunum against the closed upper third of the lesser curvature of the residual stomach. I make a small stoma not over 2 fingerbreadths in diameter about the diameter of the jejunum and, with suture of the distal limb of the jejunum against the closed segment of stomach on the side of the lesser curvature, a valvelike outlet is made; thus the stomach cannot dump its contents into the jejunum suddenly and in great volume, as it can in the Polya type of operation. This retarded emptying of the stomach can be well demonstrated by postoperative roentgenograms. In this anastomosis the proximal loop is placed at the greater curvature and the distal at the lesser curvature.

Replacement in Surgical Procedures.—Replacements for segments of the stomach have been made by various splicing operations from portions of the intestinal tract. Moroney,[13] in 1951, used a segment of the transverse portion of the colon to replace the distal end of the stomach in subtotal gastrectomy. The objects of this procedure were to prevent the symptoms of dumping and to provide more capacity for

food intake in the hope of preventing loss in weight. After this type of operation the patient can eat more and is relieved of symptoms, and there is a gain in weight. The dumping syndrome is abolished. The patients can eat fats and sugars as well as meats; there is no steatorrhea, and dextrose tolorance is normal. It would appear to be a good operation but a formidable one, obviously with an increased mortality rate due to a prolonged procedure and multiple anastomoses.

Late in 1955 Moroney reported the recurrence rate of duodenal ulcer as 8 per cent when resection was performed with vagotomy. Because of this high recurrence rate, he has abandoned it in the routine treatment of duodenal ulcer. For those who have the postgastrectomy syndrome, the results with this procedure have been satisfactory, with a gain in weight and only slight postoperative sequelae. This procedure is inferior to high gastrectomy, with or without vagotomy, for duodenal ulcer, because in no reported instance has the recurrence rate been as high as 8 per cent.

Watkins and Wittenstein[14] have used this procedure in 7 cases. In their opinion this makes possible a Billroth I type of reconstruction after subtotal gastrectomy. This results in what is in reality a neostomach, and food is delivered slowly to the duodenum. These authors consider the preservation of duodenal function important from the standpoint of nutrition. They encountered no postgastrectomy syndrome, and they advocate subtotal gastric resection with colonic substitution.

SUMMARY

The evolutionary procedures employed in the treatment of peptic ulcer are discussed step by step.

Intractable ulcer is a surgical problem. The comfort resulting from surgical treatment far exceeds any that can be obtained by protracted and repeated attempts at medical treatment.

Recurrent obstruction finally must be corrected by surgical measures.

Perforation requires surgical intervention and is discussed from the point of view of simple closure versus resection.

Massive hemorrhage is a controversial medical and surgical problem. Unbiased cooperation is urged. It is better to err on the side of early surgical relief than by protracted medical observation.

Vagotomy is discussed as a routine procedure in gastrectomy. The author concludes that there are definite values in vagotomy and that there is a useful field for its employment. Especially is it useful to patients with poor nutritional values, in cases of low-lying duodenal ulcer, and for patients with high night secretion and high acid values.

The treatment of gastrojejunal ulcer associated with gastroenterostomy and gastric resection is discussed, and a personal opinion is expressed. Resection is recommended for the former and vagotomy for the latter.

Intestinal replacement of a segment of the stomach by a portion either of the colon or the small intestine is described. Its merits and objections are noted. The procedure is not advised in the treatment of duodenal ulcer.

Attempts are made to discuss the problem from a practical point of view.

SUMARIO

Discute pormenorisadamente a evolução dos metodos de tratamento da ulcera péptica. A ulcera intratavel é de indicação cirurgica: esse tratamento excede em conforto qualquer outro método terapeutico. A recidiva da obstrução deve ser tratada cirurgicamente.

A perfuração requer tratamento cirurgico discutindo o A. o simples sutura e a ressecção. Existe ainda controversia sobre

a conduta cirurgica ou médica nas hemorragias; afirma que é melhor errar operando que deixando para agir tardiamente.

Discute a vagotomia como rotina na gastrectomia. Conclue que há valo res diversos na vagotomia e indicações precisas. Muito util nos pacientes pouco nutridos, nos casos de localisação baixa e nos casos de elevado teor de acides e secreção.

Discute o tratamento da gastrojejunal associada com gastroenterostomia e resecção gastrica expressando sua opinião pessoal. Recomenda a resecção para a primeira e a vagotomia para a última. Descreve a substituição de um segmento do estomago pelo colo ou pelo intestino delgado, registrando seus meritos e objeções. Este metodo não é aconselhavel no tratamento da ulcera duodena. Discute os problemas do ponto de vista pratico.

ZUSAMMENFASSUNG

Die entwicklungsmaessig sich ergebenden Formen der Behandlung des peptischen Geschwuers werden Schritt fuer Schritt eroertert.

Das unbeeinflussbare Geschwuer stellt ein chirurgisches Problem dar. Die guenstigen Wirkungen chirurgischer Behandlung ueberwiegen bei weitem die, welche durch ausgedehnte und wiederholte Versuche medizinischer Behandlung erzielt werden koennen.

Rueckfaellige Magenverschluesse muessen letzten Endes mit chirurgischen Massnahmen behoben werden.

Die Perforation eines Geschwuers erfordert chirurgischen Eingriff. Die einfache Schliessung und die Resektion werden einander gegenuebergestellt.

Die massive Blutung stellt ein Problem dar, bei dem sich medizinische und chirurgische Anschauungen entgegentreten. Es wird dringend zu unvoreingenommener Zusammenarbeit geraten. Es ist besser, einen Fehler durch fruehzeitige chirurgische Behandlung als durch langausgedehntes Abwarten unter medizinischer Behandlung zu machen.

Es wird auf die Frage eingegangen, ob bei der Magenresektion die Vagotomie als routinemaessiger Eingriff ausgefuehrt werden soll. Der Verfasser kommt zu der Ueberzeugung, dass die Vagotomie unzweifelhafte Vorzuege hat, und dass es ein Gebiet fuer ihre nuetzliche Anwendung gibt. Besonders eignet sie sich fuer Kranke in schlechtem Ernaehrungszustand, fuer Faelle mit tiefliegenden Zwoelffingerdarmgeschwueren und fuer Patienten mit starker Nachtsekretion und hohen Saeurewerten.

Die Behandlung des nach Magenresektion und Gastroenterostomie auftretenden gastrojejunalen Geschwuers wird eroertert und die persoenliche Ansicht des Verfassers ausgedrueckt. Bei gastrojejunalen Geschwueren nach Gastroenterostomie wird die Resektion empfohlen, zur Behandlung solcher Geschwuere nach Magenresektion wird die Vagotomie angeraten.

Es wird ein Verfahren zum Ersatz eines Magenabschnitts durch ein Dick- oder Duenndarmsegment beschrieben. Die Vorzuege und Nachteile des Verfahrens werden dargestellt. Der Vorgang empfiehlt sich nicht zur Behandlung des Zwoelffingerdarmgeschwuers.

Der Verfasser bemueht sich, die Probleme von einem praktischen Gesichtspunkt aus darzustellen.

RÉSUMÉ

L'évolution graduelle des méthodes thérapeutiques de l'ulcère peptique est décrite.

L'ulcère rebelle est du ressort de la chirurgie, dont les résultats dépassent de loin tous ceux qui peuvent être obtenus par des traitements médicaux prolongés et répétés.

L'obstruction récédivante doit finalement être contrôlée par des moyens chirurgicaux.

La perforation requiert une interven-

tion chirurgicale, depuis la suture simple jusqu'à la résection.

L'hémorragie massive est un problème médical et chirurgical controversé, et l'auteur recommande une collaboration entière, libérée de tout parti pris. Il est préférable de commettre l'erreur éventuelle d'une opération précoce que de temporiser par une observation médicale prolongée.

La vagotomie est discutée en tant que méthode de routine dans la gastrectomie. L'auteur conclut que la vagotomie comporte des avantages bien définis et qu'elle a un champ d'application utile, particulièrement dans les cas de dénutrition, d'ulcère duodénal bas-situé, ainsi que chez les malades présentant une forte sécrétion nocturne et un taux d'acidité élevé.

Le traitement de l'ulcère gastrojéjunal associé avec une gastroentérostomie et une résection gastrique est discuté, et l'auteur exprime à ce sujet une opinion personnelle. La résection est recommandée dans le premier cas, la vagotomie dans le second.

Le remplacement intestinal d'un segment d'estomac par un fragment de côlon ou de grêle est décrit, avec ses avantages et ses inconvénients. Cette technique n'est pas recommandable en cas d'ulcère duodénal.

L'auteur s'attache à discuter ce problème du point de vue pratique.

RIASSUNTO

Vengono trattati, uno per uno, i vari metodi impiegati nella cura dell'ulcera duodenale.

L'ulcera che resiste alla cura medica rappresenta un problema chirurgico; i benefici che derivano dall'intervento di gran lunga superano tutti quelli che si possono ottenere con ogni forma di trattamento medico anche protratto.

Anche la stenosi pilorica deve essere trattata chirurgicamente, come pure la perforazione, se pure in questo caso si può discutere se si debba suturare o resecare.

L'emorragia, invece, è un problema controverso sia per i medici che per i chirurghi. E' indispensabile una imparziale collaborazione, ed è meglio sbagliare facendo un intervento precoce piuttosto che procrastinare troppo a lungo con la terapia medica.

Viene discusso il valore della vagotomia come metodo complementare della resezione. L'autore conclude che essa ha un indubbio vantaggio e l'ulcera rappresenta un campo di applicazione indiscutibile. Essa è particolarmente utile nei malati in cattive condizioni, o nelle ulcere inveterate o in quei malati che hanno abbondante secrezione acida.

Viene trattata anche la terapia delle ulcere anastomotiche dopo resezione o gastroenterostomia; nelle prime è indicata la vagotomia, nelle seconde la resezione.

Viene descritto, infine, un metodo di sostituzione dello stomaco mediante colon o tenue; questo metodo non ha applicazione nella cura dell'ulcera.

RESUMEN

Se hace un estudio paso a pase de la evolución de los procedimientos empleados en los tratamientos de la úlcera de estómago.

La úlcera intratable es un problema quirúrgico. El resultado que se obtiene después de un tratamiento quirúrgico es con mucho superior al que pueda lograrse después de ditatados y repetidos intentos de tratamiénto médico. La obstrucción acaba finalmente por tener que ser corregida por métodos quirúrgicos.

La perforación requiere intervención quirúrgica estando la discusión entre el simple cierre o la resección. La emorragia masiva plantea también un dilema entre el médico y el cirujano. La colaboración imparcial es indispensable; mejer es equivocarse anticipando la cirugía que perder

el tiempo con observación médica. Se discute si debe o no ser la vagotomía el procedimiento de rutina. El autor cree que la vagotomía tiene un valor efectivo y un amplio campo de empleo. El especialmente es útil en enfermos en mal estado de nutrición, en úlceras muy lejanas en la segunda porción del duodeno y en los sujetos con gran secreción ácida nocturna.

Para los casos de úlcera aparecida después de una gastroenterostomía o de una resección la opinión del autor es la seguiente: resección en el primer caso y vagotomía en el segundo.

Se describen también las técnicas de sustitución de un segmento de estómago por un trozo de intestino delgado o grueso señalando sus ventajas e inconvenientes. Este método se a conseja en los casos de úlcera gastroduodenal.

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The introduction of an accurate method of taking blood-pressure was not greeted with universal acclaim. The old-time clinicians had been estimating blood-pressure for a century by the simple device of feeling the pulse. They did not, it is true, estimate the blood-pressure in terms of millimetres of mercury, but spoke of a high tension, a normal tension, and a low tension . . . They were quite well satisfied with their accomplishments and were not loud in their praise of the new instrument.

—*Major*

Frostbite

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COLD injury has long been recognized as serious, and in the upper midwestern areas, where winters are quite severe, the University Hospitals at Madison, Wisconsin, receive on the average of 4 cases yearly (93 cases between 1927 and 1958). Owing to the comprehensive nature of cold injury, this report is concerned primarily with a clinical study of cases in which tissue freezing *per se* is the principal injury. In addition, a brief review of certain selected current publications dealing with the pathogenesis and treatment of frostbite is presented.

Definition.—Frostbite is a generic term for a clinical syndrome that follows exposure of an extremity to freezing temperatures, the result being frozen tissue. Other cold injuries, such as trench foot, immersion foot, and various ill-defined conditions of the feet,* are closely allied to frostbite in that each represents a clinical entity resulting from prolonged exposure of part to cold, however, tissue freezing is absent.

For clinical purposes frostbite is divided into four degrees of severity, as follows[1]: (a) first degree, characterized by erythema, edema and desquamation of the superficial layers of the skin; (b) second degree, manifested by blister formation, however, only partial thickness of the skin is involved; (c) third degree, involving full thickness of the skin, which results in ulceration into the subcutaneous tissue, and (d) fourth degree, involving the entire thickness of the skin, and damage to adjacent soft tissue and bone with loss of the part. In many instances all degrees of frostbite are present in a frostbitten extremity. It is recognized that, when one views frostbite in this fashion, consideration must be given to the deleterious effects of cold *per se* on tissue, and in a clinical sense the two conditions are often indistinguishable; in addition, cold appears

A brief physiopathologic and therapeutic review of frostbite is presented. Although the extensive literature on this topic lends itself to generalization, it suggests strongly (1) that much of the tissue injury and necrosis associated with frostbite occurs during the freezing of the tissues, and (2) that the vascular sequelae observed after thawing, indicated principally by intravascular thrombosis, are considered complications of this injury.

Treatment, therefore, is directed to the stage at which the frostbite is first observed. In the presence of tissue freezing, rapid warming in a water bath at 43 C appears the most beneficial measure. After thawing, however, rapid warming is contraindicated, and treatment is directed toward maintaining circulation in the thawed part, the wound being cared for according to the accepted principles of wound healing, with emphasis on the prevention of infection and of further injury to the tissues.

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*A term employed during the Korean War as a diagnostic title for those cases of cold injury in which the feet of patients showed hyperhidrosis, erythema, maceration and denudation of the plantar surface.

to play an important role in the complications resulting from a severe degree of frostbite. As nonfreezing cold injury represents a different mechanism of tissue injury, however, it will not be discussed in this paper.

Material.—The records of 93 cases of cold injury have been reviewed. In this group there were 35 patients with gangrene of the cold-injured part; in the remaining 58 no tissue loss was noted. Unfortunately, the clinical records did not indicate clearly whether actual tissue freezing had taken place; in 15 cases, however, conditions were highly suggestive that freezing had occurred, in that the cold injury was incurred at temperatures well below freezing, the duration of exposure was prolonged, and the patients described their injury in terms such as "my feet were frozen solid" or "frozen hard as a rock." In each of these 15 cases the hands and/or feet were the anatomic parts involved, and gangrene was present in each instance. It was of interest that no patient in this group was treated by a physician at the time the extremity was frozen; when medical treatment was initiated, thawing had apparently taken place, and edema, blister formation, discoloration and impending gangrene were the principal problems. In general, the patients initiated treatment of their own accord in one of three ways: (a) by permitting the part to thaw or warm at room temperature, (b) by applying cold to the involved extremity or (c) by plunging the frozen or cooled part into warm water. The merit of each of these methods of treatment was difficult to evaluate, as gangrene was present in each of the 15 patients; nevertheless, it was the impression that those patients who applied rapid warming fared somewhat better, since their tissue necrosis was the least extensive.

The treatment given patients with a gangrenous extremity was primarily conservative. Usually an interval of four to six weeks was permitted for demarcation to take place, after which time an open amputation was performed. If the gangrenous area became "wet" or infected, however, immediate amputation or a drainage procedure was initiated. During this period of waiting careful attention was given to care of the wounds, with emphasis directed toward prevention of infection and further tissue trauma. In a few cases sympathectomy was done in conjunction with the amputation. Suffice it to say, hospitalization in all cases was prolonged, averaging three months.

Pathogenesis.—As has been indicated, this paper is concerned primarily with frostbite, i.e., tissue freezing; and although it is difficult clinically to separate late frostbite from other and nonfreezing cold injuries, the altered physiologic state resulting from tissue freezing represents a pathologic process that is separate and distinct. As a matter of convenience, a brief summary of some of the current concepts with regard to frostbite seems in order.

In brief, mammalian tissue, when subjected to prolonged freezing and then thawed, is seriously injured and is characterized by various types of tissue necrosis. These changes have been described as involving skin, nerve, muscle and osseous tissue.[2] In addition, a wide variety of vascular lesions has been recorded, including intravascular thrombosis, nonspecific segmental arteritis and lesions resembling endarteritis obliterans.[3]

The vascular changes resulting from frostbite have been extensively studied,[4] and to list them all would be difficult, but for general interest some of them will be mentioned. Shumacker[5] has demonstrated arteriographically that blood flow is increased shortly after thawing, only to be followed by a decreased flow during the

post-thawing period. Similar studies performed on the surviving extremities of animals, days and even months after the freezing experiments, have shown tortuosity and dilatation of the arterial tree.[2d] In addition, late clinical studies of war veterans who incurred cold injuries during World War II and the Korean War have suggested the blood vessels in the skin of the involved extremity do not respond normally to vasodilation or vasoconstriction stimuli.[6] Another interesting example of the vascular response to tissue freezing has been provided by the transillumination microscopic studies of rabbit ears by Quintella,[7] and by Crismon and Fuhrman.[8] These investigators observed that during the frozen state the area under examination appeared opaque. Once thawing had occurred, normal tissue was observed; with further warming, however, hyperemia and edema developed and were followed by slowing of the circulation, sludging of the cellular components of the blood and, eventually, cessation of blood flow and death of the tissue. A number of authors have interpreted these data in a manner that suggests a vascular cause for the tissue injury associated with frostbite.

Others, however,[4c] have discounted the vascular etiologic theory and have pointed out that in some frostbite experiments tissue injury has been observed as early as fifteen minutes after freezing has taken place, while in experiments dealing with ischemia, a period of three or four hours of total arterial occlusion has been necessary before tissue injury was noted. To some observers[9] these findings have suggested that frostbite is essentially a thermal type of injury, comparable in many respects to a burn, and that the "direct action of cold on tissue" is the cause.

Recently Meryman[10] and his associates have clarified much of the current knowledge concerning frostbite and have fitted together some of the aforementioned observations into an all-embracing explanation for the tissue injury present in this condition. Briefly, Meryman has made the significant observation that clinical frostbite is a slow freezing process, with ice crystals developing exclusively from the available water in the extracellular compartment and according to physical laws that govern the transformation of a liquid into a crystalline state. Under these conditions, in his opinion, a hypertonic solution gradually forms about the cells, producing, in effect, a local type of tissue dehydration with the cells simply collapsing between the ice crystals. Meryman discounted for the most part the mechanical factor of ice crystals rupturing the cells, and suggested that the principal cause of cell injury is biochemical, a result of the hyperconcentration of solutes (enzymes, carbohydrates, proteins, electrolytes and the like) in the tissues. In

Fourth degree frostbite *(A)* of both hands and *(B)* of both feet. Note bleb formation, ulceration and gangrene.

addition, Meryman pointed out that as the temperature is lowered more water is frozen out, increasing, as it does, the concentration of solutes surrounding the cells and also the potential for cellular injury; he indicated that in this manner the degree of cellular injury is progressive and proceeds with the time-temperature relation. In support of his theory he cited a number of well-documented experiments that describe cellular injury, altered protein structure, reduced enzyme activity and other dysfunctions of cellular life when the normal physiologic constituents [principally electrolytes] are increased by chemical or freezing methods. In addition, the Fuhrmans[1] have demonstrated, from oxidation studies performed on frostbitten tissue, that much of the tissue injury occurs during freezing or the early post-thawing phase.

Finally, Meryman, in explaining the vascular changes associated with frostbite, emphasized the fact that tissue injury occurs primarily during freezing; once thawing has taken place, the vascular changes described from transillumination studies, namely, slowing of the circulation, "sludging" and intravascular thrombosis, represent a complication of frostbite and are similar to vascular changes associated with other forms of tissue trauma. At the time of writing Meryman's explanation of the pathogenesis of tissue injury as observed in frostbite is most reasonable and appears to be most adaptable to practical therapeutic application.

Treatment.—The treatment of acute frostbite has been primarily concerned with the effect of (1) rapid thawing, (2) slow thawing, and (3) the application of cold on final tissue survival. In many reports, laboratory studies have shown beneficial as well as detrimental effects of each of these methods. Unfortunately, the laboratory experiments[12] have varied so widely that a valid comparison of data cannot be made. In general, the great bulk of data that has accumulated on this subject indicates (1) that cold has little therapeutic value and should not be employed, and (2) that rapid warming of the frozen part in a water bath at 43 C is the most satisfactory method of managing acute frostbite. The effectiveness of rapid thawing as a therapeutic procedure appears to be related to the shortening of the time during which the frostbitten tissue is exposed to a cold environment.[10] Still, there appear to be additional unexplained factors associated with rapid warming at this temperature, as increased tissue survival is not obtained when rapid warming is employed at temperatures a few degrees below 43 C.

For the most part, rapid warming at 43 C has been accepted as a beneficial form of treatment by a number of investigators.[13] Certain aspects concerning the controversy between rapid and slow thawing, however, require clarification. Meryman, and especially Hardenbergh,[13b] in comparing data from various experiments dealing with this problem, have pointed out that in those experiments in which rapid thawing was effective the extent and/or depth of tissue freezing, as well as the intensity and duration of exposure, were minimal. When these factors were increased, and principally with respect to their duration, tissue survival decreased. In a similar fashion, when the duration of the frozen state was increased, tissue survival also decreased. With these observations they have suggested that in frostbite there is a point at which tissue injury is irreversible, irrespective of the treatment afforded; and, in those frostbite experiments in which rapid thawing was ineffective, the methods employed in producing the frostbite lesions resulted in an irreversible injury. Furthermore, the temperature for thawing was, in some of these experiments, not the prescribed 43 C.

In reviewing much of the literature directed to the treatment of frostbite, it is quite apparent that in frostbite there exists an extremely narrow zone between tissue survival and tissue death; and, in terms of organ resistance, skin is less susceptible to the freezing injury than is muscle, while blood vessels and nervous tissue are intermediate. Still, Meryman's approach to this problem seems quite reasonable, in that he considers frostbite a type of tissue injury, and, as is true in the management of any injury, removal of the causative factor is fundamental in early management. In frostbite, rapid thawing in a water bath at 43 C is directed to this end.

Other therapeutic measures have been employed, and to list them all would be difficult; those that have received most prominence in the English literature, however, are heparin,[14] rutin[15] (to lessen capillary fragility), antihistamines[15b] (histamine is presumably present in the cutaneous blebs of frostbite), cortisone[16] (to counteract the inflammatory reaction), the systemic use of vasodilators[17] and surgical sympathectomy.[18] In many experimental studies, tissue survival has been reported as enhanced by each of these agents and methods of therapy; in others, controversy exists as to their usefulness. During the Korean War, when frostbite was observed in large numbers of American military personnel, heparin, cortisone and vasodilators were used; the clinical results with respect to tissue survival, however, were not encouraging.[19]

The equivocal results of these drugs in cases of clinical frostbite, in contrast to reported successes in the laboratory, appear to be due to the manner in which they were employed in clinical situations; for in most experimental studies therapy has been initiated before or very shortly after thawing has taken place. During the Korean War, and in patients observed in the series here reported, frostbite was seldom, if ever, treated by physicians during the frozen state, and in most instances adequate medical therapy was not begun until thawing was complete, at which time the degree of tissue injury had been determined and the vascular sequelae of this injury fully developed. It is this point that deserves emphasis, i. e., applying experimental methods of therapy to identical clinical situations, and, as Meryman has pointed out, this factor has not been adhered to in cases of clinical frostbite when various experimentally tested therapeutic agents were employed.

In like manner, if rapid thawing at 43 C is to be employed clinically and with expected experimental benefit, it must be employed for a frozen extremity or to one in which thawing has just commenced. Once thawing has taken place and is complete, rapid warming is contraindicated; the main problem at this point is that of ischemia resulting from intravascular thrombosis; and, as Meryman has indicated, treatment at this stage should be directed to maintenance of circulation and prevention of further tissue injury, according to present concepts of wound healing. During the Korean War frostbite was managed in this fashion, and most authors[19] emphasized the use of antibiotics and the prevention of wet gangrene by employing dry dressing and prompt débridement once it occurred. In addition, they pointed out the value of waiting for demarcation to present itself spontaneously (sometimes as long as four weeks) before amputation of the involved area was undertaken.

One factor noted in the cases reviewed in this series deserves comment, namely, the fact that both patient and physician looked upon frostbite as a relatively minor injury, and only after unmistakable signs of tissue necrosis became evident was the seriousness of the injury realized. It would seem appropriate to prescribe bed

rest as a necessary form of therapy to prevent further trauma, principally when the feet are involved—a feature of frostbite treatment that has not received the emphasis it deserves.

The use of systemic vasodilators and anticoagulants (principally heparin) for frostbite has been the subject of considerable experimental investigation;[20] as has been stated, however, the beneficial results are controversial. When these agents were employed during the Korean War, their effect in preventing or limiting the expected tissue loss was not striking. It would appear that, if heparin is to be employed to its fullest theoretical potential, it should be administered before intravascular thrombosis has taken place, and even then experimental evidence suggests that it may have little value. With respect to systemic vasodilators, Meryman's opinion is that their use may be harmful; hypotension frequently follows their administration, and when this occurs the blood flow to an already ischemic area is reduced. At present, data concerning the use of sympathectomy early in acute frostbite are limited primarily to experimental studies, and their results are inconclusive.

It is quite apparent, therefore, that the management of frostbite according to contemporary methods is inadequate. It appears, however, that current concepts of the immediate treatment of frostbite deserve reconsideration, as rapid thawing has been shown in experimental studies to offer considerable benefit with respect to preservation of tissue. Unfortunately, in clinical situations a frostbitten extremity is seldom seen by a physician in the frozen state. Nevertheless, it would seem practical to instruct persons whose occupations and geographic environment make them susceptible to frostbite in the rapid warming technic outlined in this paper. In like manner, members of police forces, ambulance personnel and those whose work may indirectly bring them into contact with frostbite, should also be instructed in the fundamentals of rapid thawing and in recognition of the inherent difference between it and nonfreezing cold injuries.

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ZUSAMMENFASSUNG

Es wird ein kurzer Ueberblick ueber die pathophysiologischen Verhaeltnisse bei Frostschaeden mit Anmerkungen ueber die Behandlung gegeben. Wenn auch die umfangreiche Literatur auf disem Gebiet leicht zu Verallgemeinerungen fuehrt, so scheint sie doch stark anzudeuten, dass [1] ein erheblicher Anteil der mit dem Frostschaden einghergehenden Weichteilveretzungen und Nekrosen waehrend der Erfrierung des Gewebes auftritt, und dass [2] die nach dem Auftauen beobachteten Gefaesstoerungen, die sich hauptsaechlich als Thrombosen innerhalb der Gefaesse erkennen lassen, als Komplikationen der Schaedigung angesehen werden muessen.

Dementsprechend richtet sich die Behandlung des Frostschadens auf die zuerst beobachteten Stadien. Wenn das Gewebe gefroren ist, besteht die wirksamste Form der Behandlung offenbar in rascher Erwaermung in einem Wasserbad von dreiundvierzig Grad Celsius. Wenn Auftauung eingetreten ist, ist rasche Erwaermung kontraindiziert und sollte sich die Behandlung auf Erhaltung der Zirkulation der aufgetauten Teile richten, wobei die Wundversorgung nach den allgemeinen Grundregeln der Wundheilung mit besonderer Beachtung der Verhuetung einer Infektion und weiterer Gewebsverletzungen erfolgt.

RÉSUMÉ

Une brève étude sur les aspects physiopathologiques des gelures est présentée,

accompagnée de commentaires quant à leur traitement. Bien qu'une littérature abondante tende à la généralisation, il en ressort: 1) qu'une grande partie des lésions tissulaires et nécroses associées aux gelures, se produisent durant la congélation; 2) que les séquelles vasculaires notées après la décongélation et se manifestant surtout par des thromboses, sont considérées comme des complications secondaires.

Le traitement des gelures s'adresse donc aux stades visibles en premier lieu. En cas de congélation tissulaire, un réchauffement rapide dans un bain d'eau à 43° C, semble être la thérapeutique la plus favorable. Mais celle-ci est contre-indiquée lorsque la décongélation s'est déja établie; le traitement doit alors viser à maintenir la circulation dans la région décongelée, en prodiguant à la plaie les soins habituels, et en veillant à prévenir l'infection et à éviter tout traumatisme tissulaire supplémentaire.

RESUMEN

Se presenta en este trabajo una breve revisión sobre lós aspectos fisiopatológicos de las congelaciones así como su tratamiento. Aunque la extensa literatura referente a este problema ha generalizado bien su conocimiento el autor insiste en 2 puntos: (1) la mayor parte del tejido lesionado y la necrosis concomitante ocurre durante la fase de congelación; (2) las secuelas vasculares ocurridas durante la descongelación y cuya manifestación principal es la thrombosis intravascular son consideradas como complementos de esta lesión. De acuerdo con lo dicho el tratamiento de la congelación debe dirigirse de —en relación con la fase en que se comienza. En presencia de tejido do congelado el calentamiento rápido en agua a 43° parece ser la forma terapéutica más beneficiosa. Una vez que ha tendio lungar la descongelación el calentamiento r á p i d o está contraindicado y el tratamiento debe dirigirse a mantener la circulación en parte deshelada tratando la l e s i ó n de acuerdo con los principios del tratamiento de las heridas e insistiendo en la profilaxis de la infección y en evitar ulterior traumatismo de los tejidos.

SUMARIO

Revê aspectos fisiopatologicos das congelações e comenta o seu tratamento. Deduz que (1) muitas das lesões dos tecidos ocorrem durante a congelação e (2) as sequelas vasculares que surgem depois, principalmente por trombose intravascular, são consideradas complicações.

O tratamento consequentement deve ser orientado conforme o estadio da lesão. No resfriamentos os tecidos devem ser aquecidos em banhos á 43°C. Na fase de mortificação o aquecimento é contraindicado e as medidas são aquelas proprias á cicatrização principalmente para prevenir a infecção e aumento de traumatismo aos tecidos.

RIASSUNTO

Viene presentata una breve rassegna degli aspetti fisiopatologici del congelamento e uno schema per la sua terapia. Viene messo in rilievo il fatto che molte delle lesioni tissurali e la necrosi si verificano durante il raffreddamento dei tessuti e che le trombosi vascolari che si verificano dopo il disgelo debbono essere considerate come complicanze di detta lesione.

In accordo con ciò il trattamento deve essere diretto a seconda del momento in cui si osserva la lesione: quando è presente il congelamento dei tessuti la terapia più efficace è rappresentata dal riscaldamento rapido in un bagno di acqua a 43 gradi. In fase di disgelo il riscaldamento rapido è controindicato e la cura deve essere diretta a mantenere la circolazione nelle parti interessate, mentre la perdita di sostanza verrà trattata nella maniera

usuale con la prevenzione della infezione ed evitando ogni nuovo trauma ai tessuti.

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I cannot tell you how to make a diagnosis, but in your review of the facts as you collect them and when you have assembled them, two questions will be passing through your mind: "What is the anatomical site of the trouble?" and "What is its pathological nature?" A correct reply to either question will go a long way to answering the other, for each organ or tissue has its own diseases, and each type of disease has certain sites of election. If you are certain that a swelling in the neck is an enlarged cervical gland, you have, for practical purposes, only to distinguish between chronic sepsis, tuberculosis, Hodgkin's disease and secondary malignant disease in order to make a diagnosis. If the swelling is a cold abscess, the site of its origin will be either in the glands or the cervical vertebrae. Bear these two questions in mind throughout. The history may answer one or the other. The characters of the pain will, for instance, in many cases, indicate unmistakably the site of its origin; its anatomical distribution may point clearly to the kidney or one of the peripheral nerves, its association with food to the stomach, or with micturition to the bladder. The history again may indicate the nature of the lesion; progressive loss of weight, strength and colour without any other symptoms in a man of fifty suggest a cancer somewhere in the abdomen, and our thoughts turn to stomach and colon; intermittent severe colicky pain suggests a mechanical obstruction, a constant dull ache points to an inflammatory lesion; in each case if we have already deduced the organ involved, our choice of diagnosis lies within narrow limits.

—*Ogilvie*

Radiation Surgery with Precision Controls, A New Approach to Carcinoma of the Bladder

Preliminary Report of Two Cases

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CARCINOMA of the bladder is a specific tumor in the whole malignancy picture which ranks high among those most difficult to treat. For sheer therapeutic complexity it is the Number One anathema to the clinical urologist.

It is time for hard questions with hard factual answers:

"In the last decade of massive research, what practical ready-to-use tool has been given the clinical urologist to advance significantly therapeutic management of the whole problem?"

The answer: "Not a single such tool."

The next question: "With full recognition of surgery and radiation constituting the only effective attack on carcinoma to date, what is the probability of the above aim being accomplished in the near future, if the present trends in both specialties are continued?"

The answer: "The evidence is that such a probability is practically nil."

Frankly, the status of both specialties is that of containment within self-limiting orbits. Surgical intervention loses effectiveness after tumor cells have penetrated a resectable normal tissue buffer, and no amount of extra effort can actually reverse this loss. Irradiation is limited by the impossibility of accurately controlling the dose to the tumor while protecting contiguous vital structures, and depends, therefore, largely on the therapeutic index afforded by the differential radiosensitivity of malignant versus normal cells. This has remained essentially unchanged by the addition of isotopes and high voltage sources.

The obvious implication is that a new approach may result from a more critical analysis of the present therapeutic en-

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The author outlines a new approach to the management of carcinoma, designated as "radiation surgery with precision controls." Carcinoma of the bladder, which is notoriously difficult to treat, was selected to test the validity of the concept, and the clinical results in 2 cases demonstrate its success. In the author's opinion the potential of the new method is considerable, and its adoption and application over a wide field will be facilitated by the simplicity of the devices required in its use.

vironment and a reduction of this environment to basic elementals, as follows:

1. In spite of superficial liaison, there has been no real integration of surgical with radiologic treatment or vice versa.

2. *Complete union* of the two specialties, as with a chemical reaction, would not be mere addition. The results would differ in *quality*, just as two gases through chemical union may produce a qualitatively different end product in the physical form of a liquid. The addition of the same two gases without molecular union results only in more of the same form (gas); i.e., a *quantitative* result.

3. The surgical environment, especially that involving the physical sciences, is ripe with new material. The polymer chemist and the radiation physicist offer a new world of material with medical potential, but it is up to the profession to take the initiative, for surgeons are the exclusive practitioners of the science of surgery.

The following, therefore, describes the initial phase of integrating surgery, radiology and the physical sciences into a single unit of equal partnership. Application of this possibility to carcinoma of the bladder provides a formidable testing level for the infant concept.

Precision Controls in Radiation-Surgery.—The degree of scientific advance is largely measured by the trend toward precise measurement, isolation of variables, controls, deepened understanding of cause and effect and increasing predictability of results.

To make one point clear, the science equates itself against itself for signs of progress. The degree of permissible error in a technic labeled "precise," would be laughable by the standards of the physical scientists. Here, however, it is an appropriate term.

Actually, this situation is fortunate; otherwise the concept of surgical precision would be highly impractical. The fortunate aspect lies in the smaller size and greater flexibility required of measuring devices as the requirements for absolute precision lessen. This permits easier adaptation to surgical needs.

The approach incorporates several surgical "firsts," or innovations, plus the utilization of all pertinent past technics. Application of new concepts, such as internal shielding and internal dosimetry, open many new ancillary technics of control. It is the totality of these plus those already established which permits operating on a level unattainable in the past. This point is important to a perspective distinguishing the new approach from its partial applications in the past, which have only a superficial similiarity.

For the purposes of immediate and widespread practical application the technic was devised to require only the most common source of radiation therapy now available to the small institution, namely, the roentgen therapy tube. The specific controls, as listed, are limited by reference to the moderate voltage roentgen tube.

Specific controls now considered applicable are included in the following list:

Internal Dosimetry: This term designates a technic of precision measurement of ionizing radiation directly applied to internal structures by surgical means (as opposed to limited use, such as insertion through a natural orifice). Actual depth doses of both target and normal tissue loci provide a control check on calculated doses.

Internal Shielding: This consists of the introduction of a shielding device *internally* by the surgeon. Thus a target area is defined, and vital areas are protected by two shielding methods, as follows:

a. *Distance Shielding.* This provides the safety factors of increased parallax, removal of contiguous strictures from the radiation field and use of distance to pro-

vide safety through calculated falloff in depth. Distance shielding is regulated by surgical cleavage planes.

b. *Absorption Shielding.* The total mass and distribution of the solid shield is known. Solid material is adaptable and malleable. Liquid absorption shielding will assume the shape of its container. The exact mass is known. The shape may be altered by container, gravity, or compression. Changes in mass and shape are easily made without entering the sterile field.

Direction: The therapy tube is guided by direct vision of anatomic structures. It may be altered to prevent concentration, or to effect better distribution of the dose.

Target Controls: The tumor mass may be compressed for uniformity, isolated, molded to optimal shape, shifted or retracted, precisely measured in three dimensions and reduced in size, as indicated. Exact units of dosage to tissue at all loci may be calculated; there is direct tube contact, and all relations are fixed or controlled. A check of pretherapeutic relation involves only a lateral roentgenogram.

Radiation Source Controls: Varying the type of irradiation with the situation or technic, lessening the duration of therapy with a closer source, calculating distribution with multiple sources having fixed relations and directional controls, are all possible. One is enabled to reduce the total body absorption of radiation and to reduce or diffuse concentration on nontarget tissues. Therapy now may be started or stopped at will for dosimetric procedures and checks on the patient's condition.

Tissue Therapy Controls: There is wide latitude of safe therapeutic dosage as a result of the controls aforementioned, plus surgical drainage. The exact amount of radiation delivered to vital tissue is known, and a controlled base for possible subsequent radiation is established. Externalized tissue may offer direct histologic check.

Precision Radiation Surgery and Qualitative Advance in Therapy.—Specifically, then, what in the management and results is qualitatively different about the new approach as compared to present technics?

To enumerate some vital differences:

The controlled situation allows for single-shot therapy with the patient under anesthesia, as part of the operation, and this approaches certainty of destruction of tumor mass and safety of vital tissue more closely than ever in the past. The factor of discontinuous absorption of radiation loses significance as total target destruction by a single massive and overpowering dose becomes safe and practical. The predominance of guesswork is taken out of tumor dosage and normal tissue irradiation. Single precision doses may now be calibrated and related to tissue response.

The therapeutic index undergoes enormous expansion. The differential cell principle does not set the index limits. Terms dependent upon past therapeutic indices and other binding factors now have no real frame of reference, hence no real meaning; for example, "a radioresistant tumor."

Surgical integration can liberate some attitudes again bound by past limitations. An example is the significance of slough with surgical drainage versus underdosage and residual viable tumor cells. The radiologist's fear of slough, once appropriate, must be reevaluated downward when necrotic tissue is adequately drained.

Results are not dependent on equipment for radiation therapy that is unique or not available in the average hospital. The procedures must be adapted to this without delay. More specific equipment will assure superior technics, but all statements about present application refer to what is *now* available.

No amount of high voltage equipment, isotope forms, or any other exclusive devices can approach duplicating these re-

sults. This means that the average local hospital is now in a position to do far more for patients with carcinoma than can be offered by the large metropolitan medical center which uses only conventional technics, superior equipment to the contrary. This is not to say that imaginative application of the superior facilities to the principles of precision radiation surgery would not further enhance its potential.

Prolonged massive surgical resection can be replaced by destruction *in situ*. For future reference, this will include sterilization of lymphatic chains. Also, the destruction *in situ* will come nearer completion than does surgical dissection. This is best seen where the limits of resection are set by danger zones, such as large vessels. Precise fixed relations as sources of radiation can be placed to this point or beyond, and destruction of tumor cells further extended by utilizing the differential cell principle in a marginal zone.

The limits of the approach are set by gross ocular estimation of involved tissue. This is advanced beyond the absolute surgical limit by the additional zone using the differential cell principle. Regardless of subsequent refinement in technic, if this limitation remains, the concept can in no way be construed as ultimate or referred to as a "cure," the more nearly accurate term would be "approach."

The principles appear applicable to all parts of the body as determined by the surgical specialist familiar with the problems of the area. Obviously, different systems, areas and situations will gain varying benefit; but more refined technics should be awaited before application is ruled out even in the most difficult locations.

Subsequent radiation therapy will start with a record of exact exposure of vital tissue.

Overall absorption of radiation by the patient is greatly reduced.

The complications and pain of radiation therapy are reduced. The total amount and delivery time of such therapy is reduced and contracted into the one-shot dose measured in minutes.

General apprehension over one-shot therapy is not realistic, considering accurate measurement and controls. The situation is incomparably safer than divided-dose therapy as conventionally administered. Superior controls are reassuring to both the patient and the medical team.

In spite of the limitation stated, annual death rate and pain could be appreciably reduced through widespread application, for reasons more indirect than direct. Discussion of this situation is deferred to the future, in order to confine this paper to the minimum length required for the reader's comprehension.

Refinements in technic, now at the blueprint stage, will offer advantages well over and above this initial application. Again, however, the scope of this paper limits discussion as to what is immediately applicable.

Preliminary Planning of Technic.—Diversion of urine must precede radiation therapy.

In the work on which this article is based, the shielding material for absorption was lead sheets of varying sizes, 1.5 mm. thick, malleable, covered and padded.

The possibility of soft secondary rays where heavy irradiation strikes the lead surface, producing irritation in contiguous tissue, was ruled out by interposing 1/16 inch aluminum plates.

Some lead shields in appropriate areas were supported by retractors; in other instances the weight was of value (overpadding) in depressing vital tissue contents away from the tube, such as in the pelvic brim.

Preliminary phantom studies on a skeleton gave satisfactory results. Less than 10 per cent of the single-source dose

(1,700 r) penetrated minimal lead shielding to the rectal area.

Dosimeter film (DuPont, type 558) had to be protected from pressure points, moisture and grossly incorrect angulation. Correction was made for elevation of temperature. Sterilization with ethylene oxide was observed not to alter the film. The film was so placed as to touch the tissue to be measured and was protected from metal and secondary scatter rays with padding. Plans were made to attempt placing the surface of the film as close to a right angle with the axis of the radiation beam as was practically possible.

It was incumbent upon surgical measures to adapt themselves to existing radiation equipment, as the latter was more or less fixed. Planning included movement of the patient from the operating room to the roentgen therapy room.

The exact dose to be given was questionable. The fact that the single dose has far more killing effect than divided doses was known, but the exact ratio was conjecture. A dose of 1,700 r was selected for the initial case.

In addition to this, the critical tolerance of vital tissue also was considered appreciably reduced in the one-shot treatment, the exact ratio again being conjecture.

Stringent criteria were set for shielding protection, the goal being 10 per cent or under of the dose delivered. This could be varied with the case, and raised, for instance, when there had been no previous exposure to radiation. One could scarcely expect virgin bladders, however; on the contrary, the initial cases are likely to be those in which all other measures have been tried and have failed. In such cases, for a good margin of safety, it must be supposed that vital tissue has taken doses near capacity, and the very least additional irradiation the better.

Report of Cases and Development of Technic

Case 1.—A 55-year-old man was selected as a patient excluded from any satisfactory alternative. The history included that of widespread recurrence of a vesical tumor after previous procedures. The recurrent growth was now beyond any control by conservative surgical means. Extreme pain, strangury, hematuria, frequency of urination and pyuria developed. One kidney had been resected. Severe chronic asthma complicated multiple allergies. To this was added arrested pulmonary tuberculosis.

No traumatic operation or prolonged Trendelenburg's position could be considered, as the patient was in chronic low-grade anoxia, with marked air hunger. He had undergone no previous irradiation.

He was given all details concerning his status as the first application of the new procedure. Consent was recognized only with full acceptance, an optimistic mental attitude being considered essential in all cases, but especially initial cases.

Technic:* Instrument System 1 was built to transport the patient, with a fixed patient-table relation, to the therapy room.

A routine dissection plane was made to separate the rectum from the prostate and bladder. The space developed was 8 cm. deep, 5 cm. wide and 7 cm. high. It was filled with 19 mm. of lead shielding, aluminum plates, padding and plastic-covered dosimeter film, the latter placed next to the prostate and trigone, and behind the shielding, in front of the rectum.

Through an abdominal incision the edge of the wound and the small intestines were retracted and shielded, as was the pubis. Free padded lead plates were applied to the pelvic floor, depressing and covering the rectosigmoid and its dosimeter film. The bladder was molded into a target within a container. The dosimeter film was applied to the skin, small intestine, pubis and depths of target tissue. The tumor mass was 6.5 cm. deep.

The area was covered with sterile drapes and the patient taken to the roentgen therapy room.

A sterile therapist covered the therapy tube with sterile aluminum foil and directed the tube at an angle to cover the target. Contact

*Operation performed at St. Clare's Hospital, New York City, on May 2, 1958.

of the tube with tumor tissue was assured. A sagittal section of the area, diagrammatically illustrated, is seen in Figure 1. Note how the skin, pubis, small intestine and major portion of the pelvic floor are protected from all but minor exposure by being excluded from the therapeutic beam.

The patient was given 1,700 r from a 50 cm. source (200 K.) in twenty minutes.

He was returned to the operating room for wound closure with drainage.

The patient progressed well, and his asthma and vital capacity were greatly improved. There were no signs of local tissue damage to any vital structure, the rectum included. There were no systemic signs of radiation effect.

Ten days after therapy, a pathologic specimen showed a pronounced effect from radiation, with a major part of the bladder wall fibrotic. There never appeared any necrosis or slough, but the bladder contracted a capacity of one-half ounce.

Five months after the operation rectal examination revealed a normal rectum and a small, practically absent prostate. No impotence resulted.

The general condition of the patient continued improved, including skin color, vital capacity, absence of asthma and a marked gain in weight.

Critical Evaluation of Technic 1.—Although the goals were accomplished, there were several glaring deficiencies in the technic.

The instrument system was cumbersome and inefficient. There was also a lack of flexibility to accommodate all changes of roentgen therapy tubes.

Shielding protection was more than adequate, but, with a tumor depth of 6.5 cm. and a single source, the distribution was considered substandard, good present

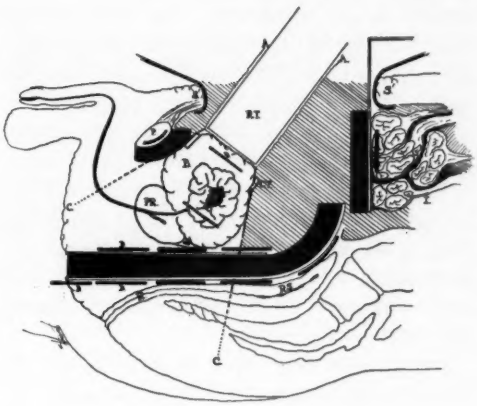

Fig. 1

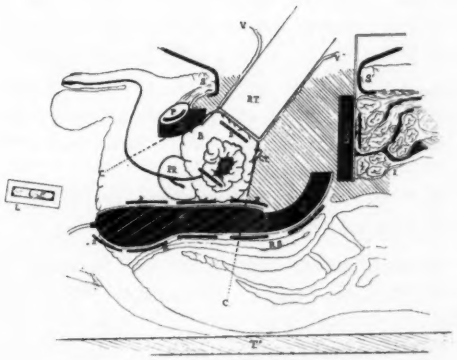

Fig. 2

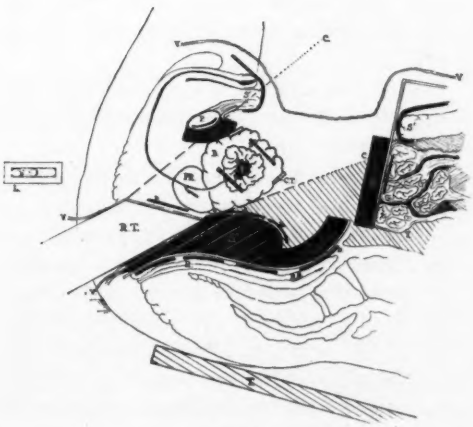

Fig. 3

Figs. 1, 2 and 3.—*A*, aluminum foil sterility barrier; *B*, urinary bladder; *C*, limits of radiation beam; *C.T.*, tumor mass container; *D*, dosimeter film; *I*, intestine; *L*, level; *P*, pubic symphysis; *Pr*, prostate; *R*, rectum; *R.S.*, rectosigmoid; *R.T.*, radiation therapy tube; *S*, absorption shielding (lead); *S'*, skin at wound edge; *S''* absorption shielding (mercury); *T*, tumor; *T'*, table, and *V*, vinyl sterility barrier.

results to the contrary. The dose at the very bottom of the tumor was little more than one-quarter that at the point of contact with the tube. Biopsy specimens, showing complete fibrosis in ten days, were taken at midtarget depth.

Maintaining operating room standards of sterility is extremely difficult when the field must be exposed in a nonsurgical environment and entered for manipulation, and with the therapy tube overhanging the field.

Solid shielding was unsatisfactory in the perineal area, for three reasons:

1. Continuous pressure against local vessels and tissue is present during a good portion of the operation, since this shield is the first applied and abdominal preparation follows. This was considered hazardous, as possibly tending to cause tissue ischemia and possibly venous thrombosis.
2. Continuous pressure was exerted against the dosimeter film.
3. There was no way to accommodate a second perineal source of radiation.

Rationale and Planning for Technic 2. —Before a second application was attempted, time was taken to build an entirely new and improved instrument system to fill the deficiencies found in the first. These systems, being homemade, involved two-month delays, even with the work proceeding continuously and at top speed.

The second system was constructed entirely of aluminum and included the following items:

a. A special table built on an accordion principle to adapt in length and to changes of position (lithotomy).
b. Special instruments to manage shielding and retraction, so designed as not to limit the maneuverability of the therapy tube. These were all constructed to be held in a systematized fashion, within a container of autoclavable size.
c. Special devices to manage liquid absorption shielding.
d. Devices for simplified molding and containment of the tumor mass.
e. Precision position control. A principle was used by which stirrups slide on a transverse bar and all relations are fixed for instant reassembly.

These measures were necessary in plans to use a double source of radiation. The double source promised the following advantages:

1. Uniform tissue dose distribution. Although higher voltage would give better distribution than in Technic 1, it would be unsatisfactory on many counts where the double source was applicable. These included the facts that high voltage tubes are restricted in number and that the less abrupt falloff, which gives better distribution, also penetrates the shielding more, and concentrates on vital areas for the entire dose.

2. The source could be moved closer without appreciably impairing precision distribution, since the latter could be accomplished in any case by calculation with known factors. The advantages of this are that the time required for delivery of the dose is reduced inversely by the square of the distance; more abrupt falloff increases shielding effectiveness; concentration on vital tissue areas is approximately halved, and the total body absorption of radiation is decidedly reduced, as approximately half the dose finds exit through an open wound after passing through the target tissue.

Several problems were anticipated. One of these was alteration of the surgical perspective established in the operating room by repositioning in the roentgen therapy room. To prevent this, a locking mechanism fixed both stirrup positions. The entire device was removable, as a rigid unit, for instant reapplication. The

transverse bar principle not only stabilized the whole unit but offered an adequate solution to the management of excess drapes complicating both fields with every position of lithotomy plus an open abdomen.

Mercury was considered the ideal liquid absorption shielding. It could be easily heat sterilized, and it would fill an area completely, without spaces reducing total absorption as occurred with solid material. There would be no danger of irritating secondary rays. Other advantages will be noted in the description of the technic used.

Fortunately, a new cold sterilizing agent (ethylene oxide) permitted easy preparation of plastic sheeting. A sterile plastic sheet placed over the wound would maintain operating room sterility throughout transportation to the roentgen therapy room.

CASE 2.—A 41-year-old man was selected, also for lack of any satisfactory alternative.

The patient presented a history of recurrent malignant disease of the bladder of three years' duration. Previous procedures, including two suprapubic segmental resections, with fulguration and radon seed implants (6 seeds on the dome, June 25, 1957), had been done. Eventually all control, even palliative, was lost to such measures. Painful symptoms of generalized involvement of the bladder wall and capacity reduction became increasingly severe.

The patient's mental outlook remained healthy, as some optimism returned with full understanding of his situation and the possibility of a new alternative.

Technic:* The perineal dissection plane between the rectum and the tumor tissue mass (prostate and bladder) was easily determined. Into this plane was fixed a small subtrigonal plate to raise the tumor tissue mass uniformly on pressure from below and to establish a limiting surface for precise measurement of the depth of tumor tissue. Raising the tumor tissue mass aided abdominal irradiation. In addition, a shaped container overlay the collapsed rectum. Within this was placed a double balloon, rubber and plastic, deflated and with a connecting tube. The double layer insured against tissue contact with mercury if the inner rubber balloon were accidentally broken. The shaped container controlled the configuration of the mercury level to the desired needs; otherwise the extreme density would pool the shielding, depending upon floor resistance. The metal container also gave the true measure of angulation with the horizontal, as opposed to dependence on table surface position. Table surface position may or may not reflect the actual level of the dissection plane; therefore, management of the shielding by tilt and gravity depended upon the level as related to the mercury container only. The perineal wound was covered with a plastic sheet, with the balloon tubing issuing from the surgical area and over the thigh for easy filling.

After the perineal stage, the abdomen was opened and prepared in a manner similar to that employed in the first technic. Containment of tumor tissue was managed, however, by much lighter and more flexible devices. No mercury was used abdominally, for several reasons of safety, and all shielding was accomplished with padded, malleable lead plates and distance. When preparation for radiation therapy was completed, the open and retracted abdominal wound was covered with a large sheet of sterile plastic. The edges of the sheet were secured well beyond the surgical area, with considerable redundancy left to allow for actual manipulation of the surgical field through the intact plastic barrier. The usual drapes covered the plastic, and the unit moved as a whole to the roentgen room.

Roentgen therapy was carried out by a double source as planned, except that the source remained at 50 cm. for lack of calibration at shorter distance, and instruments limited flexibility in the abdominal delivery.

Figure 2 demonstrates the situation at the time of abdominal delivery. Note how tilting is used to increase shielding over the area receiving maximum radiation. In this case 100 cc. of mercury was introduced immediately before therapy and released immediately after.

The tube (10 cm. in diameter) was directed uncovered and unsterile to the point of tumor tissue contact, only the plastic sheet intervening. The depth of the tumor tissue mass was known to be 6 cm. and the tissue density uniform; or, more accurately, the mass contained no spaces representing marked changes in density (as with air).

*Operation performed at St. Clare's Hospital, New York City, on June 21, 1958.

After the abdominal dose had been delivered, the transverse bar stirrups were locked to the table as a single unit and the lithotomy position of the operating room exactly duplicated.

The dissection plane was tilted opposite to the first, producing a slight Trendelenburg's position. This increased the mercury shielding in the cephalad direction, increasing the barrier appropriate to shielding requirements. The subtrigonal plate was removed, which allowed the tumor tissue mass to drop down as an easier target. A beveled tube was used to give greater protection to the vital tissues (intestines) lying cephalad. The tube was directed, uncovered and unsterile, to the plastic-protected target. Compression of the mercury bag by the tube automatically created heavy shielding of an exact shape. The tube was aimed to include the whole target, with the major part of the radiation hitting the target tissue only and leaving through the open abdominal wound. Figure 3 demonstrates these relations in sagittal section.

After irradiation was completed the mercury was drained and the patient returned to the operating room for completion of the operation.

Critical Evaluation of Technic 2.—Compared to Technic 1, this technic constituted a great advance. Before the positive features, however, the need for further refinement was again evident. Among these was reduction, to the least possible degree, of the movements of the patient during transportation; the closest approach possible of the therapy tube to the patient's body surface, and greater flexibility in the management of ancillary equipment. Close approximation of the therapy tube to the body is vital to obtaining target contact with a closer source.

The plastic sheet proved highly satisfactory. Its transparency permitted checking the wound setup while keeping the same sterile field obtained in the operating room entrapped beneath the plastic. Allowing some redundancy of the plastic sheet permitted a surprising amount of manipulation barehanded, as well as unsterile handling of the tube placed in contact with the tumor mass. More than this, the redundant plastic even allows the addition of more lead to increase or alter the shielding of certain structures. The advantages are still greater, for the plastic provides some support against dead weight; retraction may be carried out, and there is no fear of toxicity or contamination.

The use of liquid shielding, to which mercury is the key, was also highly gratifying and opened a challenge to more ingenious applications. Great caution is in order when open, dependent drainage cannot be carried out in the event of spillage. The property of the mercury to fill the dissection plane, elevating the superior surface and separating the walls, has the added values of gentleness and uniformity of pressure. Pressure distribution is as important dosimetrically as it is to tissue preservation. The impression is that the surgical potential of this material is still almost untouched.

The most important features of Technic 2 lie in the radiation therapy itself. The double source offers far more versatility and safety.

An examination of some extraordinary results from primitive beginnings yields the following facts:

A dose of 1,700 r was given abdominally, followed by 1,020 r per perineum; the total dose amounted to 2,720 r. The delivery time was forty minutes.

Precision measurement of the radiation absorbed by the anus, the rectal ampulla, the proximal portion of the rectum and the rectosigmoid showed the average exposure to be 90 r, or *less than 3 per cent of the delivered dose.* The average dosage through shielding to other vital tissues *was less than this.*

Precise calculation of the dose received by each layer or depth of target tissue yields figures showing amazingly uniform distribution. The margin of error for these figures now justifies the exactness indicated. For example, this 6 cm. deep

lesion received the following dose to target tissue at each centimeter level:

0 centimeter (contact at abdomen)	2,067 r
1 centimeter	2,125 r
2 centimeters	2,081 r
3 centimeters	1,931 r
4 centimeters	1,998 r
5 centimeters	1,960 r
6 centimeters	1,950 r

Thus it is possible to state with accuracy not only the total dose delivered to the target but the precise depth dose. In contradistinction to reports that state only the dose delivered to an internal target: *the statement here includes the exact dose and distribution, and justifies precise figures; the dose reported by conventional methods is an assumption of approximate range, a situation that does not justify a precise statement of the target dose received.*

To add fascination to interest, exteriorization of the bladder wall permits a real microscopic check on the effectiveness of this single shot. The section exteriorized was a broad flap with adequate circulation, fixed without constriction to a separate wound edge. The top, or apex, of the triangular flap represented the bottom, or 6 cm. depth, of the target, and the base was the contact point of the abdomen with the tube. The linear dimension of the flap, therefore, represented the depth dose to the whole target.

Only one day after irradiation there developed in the exteriorized bladder a blackened or burned appearance. This became progressively deeper. Biopsies on the third, fifth and seventh days showed progressively severe inflammatory changes in all layers. On the eighth day the tissue became a black liquid slough.

The patient's course added meaning to this:

First of all, with adequate drainage and antibiotic irrigations, the results of slough appeared no more significant than abscess drainage. There was no systemic reaction; there was no local reaction.

Relating this to the terms in current use results in a new perspective. I did this before on a theoretical level, but now I have clinical confirmation as a level test.

1. A systematic study of the reaction of human tissue to a one-shot dose is needed. This concept offers a means of relating the exact dose to the microscopic changes observed. To this is added a means of studying the phenomena of tissue resistance to irradiation with accuracy.

2. From the initial study, the sloughing dose would appear to be somewhere between 1,700 and 2,125 r. This range can hardly be considered general as yet, full cognizance being given to preexisting variables.

3. The fear of slough on the part of the radiologist has its basis in the lack of controls. Without surgical drainage, and with probable involvement of essential tissue, this is not hard to understand. The term "slough" does not carry the same impact when surgical drainage and control are employed. The perspective now is more correctly stated thus: "Better an overdose and slough than remaining viable tumor cells."

One factor of concern was the possibility that uncontrolled hemorrhage might accompany slough. My impression is that preliminary thrombotic phenomena give protection, but I am not prepared to make a definite statement this early.

4. Impotence did not occur in either case. This is significant with regard to a complication having uniform incidence in association with total cystectomy. The return of full function uncomplicated by factors in convalescence, however, must await further study.

5. Another outdated word, along with "slough," is the term "radioresistant." As a limiting term it has no meaning within our new concept, for no tumor is resistant to the involved organ sloughing dose, which we may safely deliver at will.

Rationale and Planning of Technic 3.—In process is the construction of a third instrument system. As was predictable, the trend is toward simplicity for greater efficiency. Immediate application to conditions in the clinician's own hospital requires only easily prepared devices for general distribution.

Planning Advanced Technics.—Specific plans already exist for devices to manage the deficiencies of tube therapy. This includes the problems of limited or absent shielding space, gross metastases, ill-defined unresectable tumor masses without shielding planes and the setting up of an unanticipated tumor mass when radiation and radiologist are not available. Such devices would insure that precision controls still prevail, and that postoperative precision irradiation will be effective without pain or further surgical intervention. The trend is toward new principles of design: simpler, lighter, far more effective and easily mass produced.

Compared to the problems associated with carcinoma of the bladder, the management of prostatic carcinoma by this approach would appear less difficult. As a very common male malignant condition, this deserves mention. Every other tumor site and situation presents a challenge to ingenuity with this new tool.

Although instrument system 3 is in progress, further conjecture is in the realm of technics untried. To keep extrapolation to a minimum, this statement about the future is here terminated.

SUMMARY

A new approach to the management of carcinoma is outlined, the technics of application given the descriptive name "radiation surgery with precision controls."

Carcinoma of the bladder was considered a good level test for initial application, representing a specific tumor that is difficult to treat. The clinical results in 2 cases prove the concept valid.

The development of simplified devices gives promise of immediate use by the average surgeon-radiologist team, since technics have been so devised as to require only average, common facilities for just this purpose.

"Radiation surgery with precision controls" is a new approach with considerable potential. The principles have general application and are not necessarily restricted to any one system. It represents a totality of new and old technics, a complete integration of these being required to effect the predicted results. This is clearly defined against past measures superficially similar but merely partial, and therefore incapable of approaching the results or potential of this new approach.

ZUSAMMENFASSUNG

Der Verfasser beschreibt einen neuen Zugang zur Krebsbehandlung mit einer Technik, der er den Namen "Kombinierte Strahlen- und Chirurgische Behandlung unter genauer Ueberwachung" gibt.

Der Blasenkrebs wird, da er eine spezifische aeusserst schwierig zu behandelnde Geschwulst darstellt, als ein gutes Objekt zur anfaenglichen Pruefung der Methode angesehen. In zwei untersuchten Faellen haben die klinischen Erfolge die Richtigkeit der Auffassung des Verfassers bestaetigt.

Die Entwicklung vereinfachter Apparate berechtigt zu der Hoffnung, dass dieses Verfahren bei der durchschnittlichen chirurgisch-radiologischen Arbeitsgruppe sofort Aufnahme finden wird; die Technik ist so eingerichtet, dass die ueblichen durchschnittlichen Ausruestungen

ihre Durchfuehrung gestatten. Die Grundsaetze der Behandlung sind allgemein anwendbar und beschraenken sich nicht notwendigerweise auf ein Organsystem. Das Verfahren stellt eine Ansammlung alter und neuer Techniken dar, die zweckmaessig miteinander verbunden sein muessen, um die vorausgesagten Ergebnisse zu erzielen. Die Methode unterscheidet sich deutlich von frueheren Verfahren, die nur oberflaechliche einzelne Aehnlichkeiten mit ihr aufweisen und keine Aussichten haben, Ergebnisse zu erzielen, die sich mit denen des neuen Zuganges vergleichen lassen.

RÉSUMÉ

L'auteur décrit une nouvelle technique de traitement du carcinome qu'il désigne du nom de "traitement chirurgical-radiologique avec contrôles de précision."

Le carcinome de la vessie est considéré comme un bon test pour l'application initiale de cette thérapeutique, du fait qu'il s'agit d'une tumeur spécifique extrêmement difficile à traiter. Les résultats cliniques des deux cas étudiés prouvent la valeur de cette nouvelle conception.

La création de moyens techniques simplifiés permet d'espérer l'utilisation immédiate de cette méthode par la moyenne des équipes chirurgicales-radiologiques, car elle a été conçue à l'intention des centres disposant d'un équipement courant. Les principes exposés ont une application générale et ne sont pas nécessairement restreints à un système donné. Cette méthode représente une cumulation de techniques anciennes et modernes, une combinaison de celles-ci étant nécessaire en vue des résultats souhaités. Elle se distingue nettement des anciens procédés qui sout apparemment mais seulement en partie analogues et qui ne permettent pas, à eux seuls, d'atteindre les succès qu'elle doit donner.

SUMARIO

O A. descreve uma nova tecnica de tratamento do carcinoma que denomina "tratamento cirurgico-radiação com controle de precisão." Considerando o Ca. de bexiga como um bom teste tratou dois casos com validade de conceito. A simplicidade dos metodos permite supor o emprego imediato pelos teams radiologicos porque os seus principios tem aplicação geral e não se prendem a qualquer tipo ou sistema especial. Representa uma soma de velhor e novos principios tecnicos com integração completa dos efeitos desejados.

RESUMEN

El autor da cuenta de un nuevo intento en el tratamiento del carcinoma a cuya técnica puede aplicarse el descriptivo nombre de "tratamiento radio quírúrgico con controles de precisión."

El carcinoma de la vejiga constituye un carcinoma tipo para su aplicación inicial toda vez que es un tumor específico extremadamente difícil de tratar. Los resultados clínicos en los dos casos estudiados prueban como válido este concepto.

El desarrollo de dispositivos simplificados permite el úso inmediato de este método con el equipo radio quirúrgico corriente ya que la técnica ha sido ideada en forma que requiere solamente los procedimientos ordinarios. Los principios son de aplicación general y no están por tanto supeditados a un sistema determiando. El método representa una acumulación de técnicas nuevas y viejas cuya integración es precisa al objeto de obtener los resultados deseados. Esto es francamente diferente de los métodos antiguos superficiales, que solo eran parcialmente similares, y por tanto incapaces de producir los nuevos resultados de la técnica actual.

RIASSUNTO

L'autore descrive un nuovo metodo nella cura del cancro, la cui tecnica può essere indicata col nome di terapia radiochirurgica con controllo di precisione.

Il metodo è stato sperimentato nel cancro della vescica, poichè questo rappresenta un'affezione difficilissima da trattare e pertanto può essere un buon banco di prova. I risultati ottenuti in due casi hanno dimostrato la bontà del metodo.

L'aver messo a punto strumenti semplici dà garanzia di un impiego immediato del metodo da parte di ogni organizzazione chirurgico-radiologica, e la tecnica è stata studiata in maniera tale da richiedere soltanto mezzi a disposizione di ognuno. I principi si adattano alla generalità dei casi, e sono una sintesi di tecniche vecchie e nuove, la cui integrazione è indispensabile per ottenere i risultati richiesti. Si tratta di un metodo completamente diverso se pure in apparenza simile a quelli usati in passato, e assai più efficace.

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Care more particularly for the individual patient than for the special features of the disease.

Do not squander heartbeats in cardiac disease—live within your income.

Let us emancipate the student, and give him time and opportunity for the cultivation of his mind, so that in his pupilage he shall not be a puppet in the hands of others, but rather a self-relying and reflecting being.

Should your assistant make an important observation, let him publish it. Through your students and your disciples will come your greatest honor.

—*Osler*

Selective Instrumental Arteriographic Study in the Diagnosis of Renal Tuberculosis

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The importance and proper use of arteriographic study in urologic practice is still not utilized as it might be, owing to its possible complications. In the author's opinion, however, careful selection of patients and meticulous appraisal of the laboratory data in each case would eliminate these hazards in many instances. He has made a study of a series of experimental and clinical cases in which renal arteriographic studies were employed in connection with renal tuberculosis. The results are briefly outlined, and reference is made to the author's former publications on this topic.

IT IS unnecessary to mention the importance of angiographic research in the diagnostic field, since it is already a part of modern semeiotics and, in addition, represents one of the most interesting aspects thereof. In some schools, however, its application still meets with skepticism, for the complications, some of which are lethal, are not always due to technical errors (Crawford, Kyril and others). In some cases they can be attributed to the dose of contrast medium, to the necessary velocity of its introduction and an unexpectedly massive injection into an aortic branch, or to narcosis. I refer to angiographic study in the urologic field, in which it is seldom effectively employed in the diagnosis of some diseases of particular surgical interest, among which is renal tuberculosis.

Although angiographic investigation is admittedly not devoid of danger, a more careful selection of patients and a more meticulous interpretation of the results of laboratory tests would certainly have prevented many of the complications reported in the literature. Aortographic methods, however excellent, cannot be the decisive factor in appraisal of surgical diseases of the kidney, because of the slight contrast visualization of the left renal arterial system obtainable by Dos Santos' method or the equally slight contrast bilateral visualization provided by the technic of Oselladore and Farinas or the variants thereof. For this reason some authors, including Narath, not being sure of obtaining the desired result, hesitate to recommend this type of examination to their patients.

In 1954 these considerations, among others, induced me to devise, first experimentally and then clinically, a new angiographic technic which I called selective instrumental arteriographic study of the kidney. It permits a careful and selective view of the renal arterial system with small doses (4 to 6 cc.) of contrast medium. The resultant picture can be coordinated perfectly with that supplied by the

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anatomic angiogram; moreover, it enables one to make a careful study of the velocity of circulation and of elimination of the contrast medium when one employs seriographic or roentgen cinematographic methods.

This technic and its indications and contraindications have been described in earlier publications. There were numerous confirmations in Italy (Morino; Robecchi, Chiaudano and Morino; Tarquini and Malan; Morino, Biondetti and Marani), and these were made the subject of a report to the international symposium on renal arteriography at Turin in June 1957.

Since the arteriographic picture associated with renal tuberculosis is little known and arteriographic contrast studies are insufficiently used in the diagnosis of this disease, my experience, though modest, may be useful as a contribution to this important chapter of pathology and to the effort to assess the actual value of angiographic study in its diagnosis and treatment.

Anatomopathologic Considerations.—As an aid in interpretation of the angiographic data, I wish to mention, parenthetically, the anatomopathologic evolution of renal tuberculosis, since it supplies the reason for characteristic variations of the arterial network. Tubercular infection first becomes localized in the cortical area (Medlar and Copeland), whence, through a vascular or a canalicular channel, it extends to the calycopyelic region, the center of the papilla or the corticomedullaris limitans. The first anatomopathologic manifestation is a typical granuloma with

Fig. 1.—*A*, tuberculosis of middle and inferior third of kidney. *B*, tuberculosis of inferior renal pole.

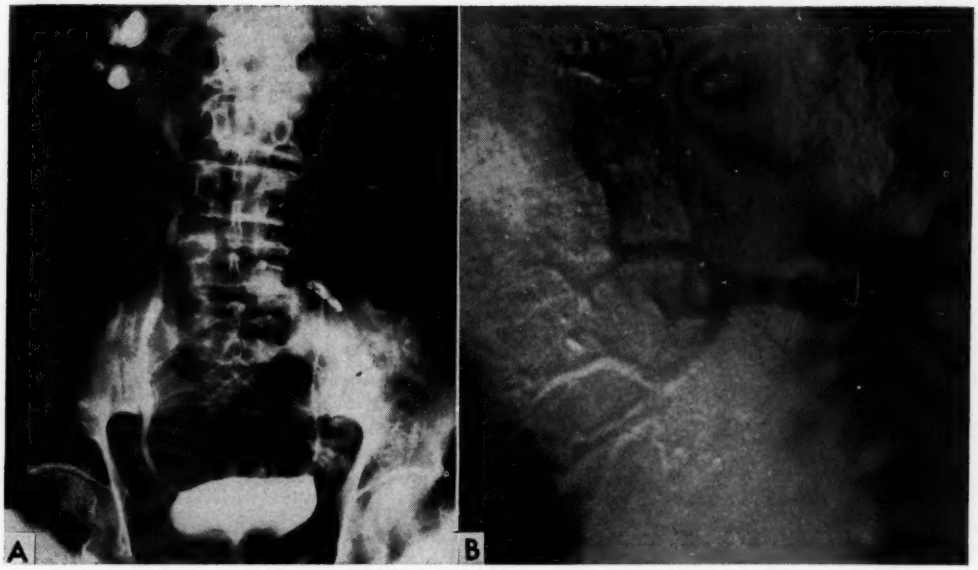

Fig. 2.—*A*, amputation of inferior group of right calyces. *B*, expanded tuberculosis (arteriogram of same patient).

a perifocal exudative reaction, followed by degeneration and glomerulotubular necrosis. The characteristic diffusion of the tubercular process toward the excretory channels produces a deep connective tissue reaction that may be followed by obstruction of the downflow of urine and caseous material, with consequent phenomena due to retention.

When the initial tubercular lesions are of little importance, with the arteries only slightly compromised, and the connective tissue reaction is intense in the particular patient, the specific granuloma may undergo fibrous transformation, or it may extend as indicated by the pathologic nature of the existing condition (cavernositis, hydrocalycosis, pseudohydronephrosis, etc.)

Attention to the vessels in a case of renal tuberculosis is required from the beginning, since the vascular alterations are verified by their correspondence with the focus and account for phenomena

Fig. 3.—Tuberculosis of the inferior renal pole.

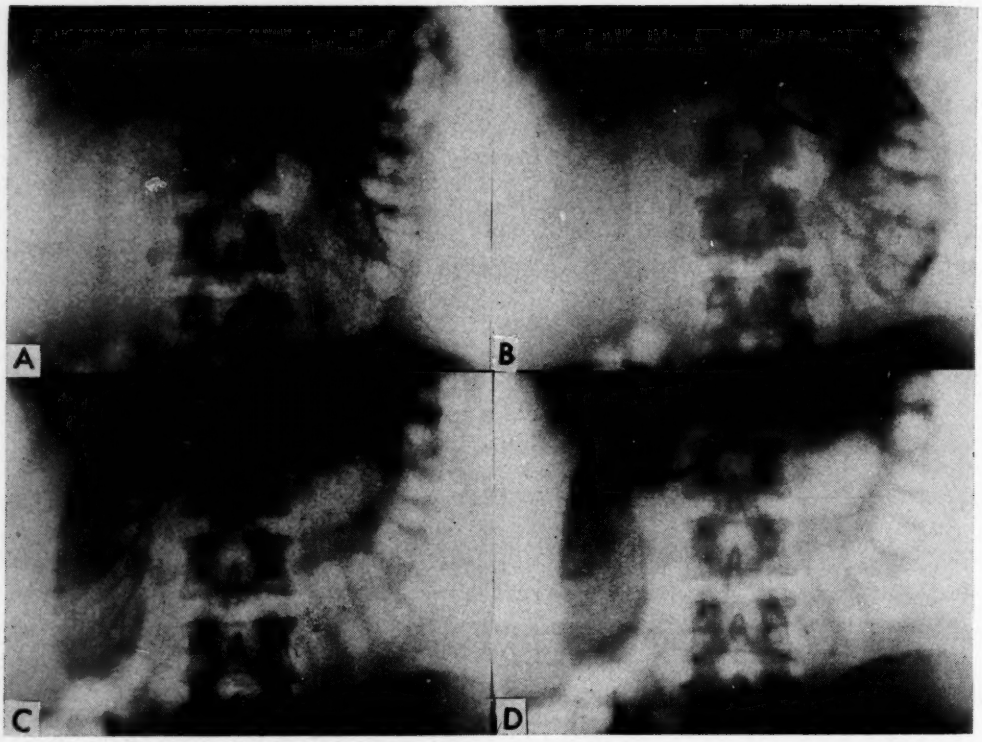

Fig. 4.—*A*, expanded tuberculosis (roentgencinematogram, arteriographic phase). *B*, nephrographic phase, same case. *C*, tuberculosis of the middle and inferior third of the kidney (roentgencinematogram, arteriographic phase). *D*, nephrographic phase, same case as in *C*.

caused by retention of urine and caseous material as reflected in the parenchyma.

Alterations in the vessels, involving chiefly the small arteries, are of two types: direct, due to periarteritis and subsequent obliterating endarteritis corresponding to the specific focus in progressive invasion of the layers of the artery, and indirect, a consequence of the stasis and retention causing modifications such as those associated with hydronephrosis. When vessels of medium caliber are involved early, it is possible to detect, by observing the terminal character of the arteries, a necrotic area and to identify the so-called tubercular pseudoinfarct.

Variations.—The angiographic variations associated with renal tuberculosis are characteristic. As a rule there is involvement of only certain sectors of the arterial network, which are plainly revealed by contrast to the neighboring normal sectors.

As the anatomopathologic evolution proceeds, a remarkable reduction in the number of small vessels can be verified as the result of obliterating endarteritis. The remaining vessels are reduced in caliber, with irregular angular borders, and frequently truncated, assuming the appearance of dry branches. This involves, naturally, the disappearance of the small net-

work that formerly surrounded branches of the first and second orders. Angiographic study also reveals the characteristically altered arteries surrounded by "shingles" or spots, a totally avascular manifestation of caseosis or calcification.

When retention phenomena are superimposed on a tubercular lesion, as I have already stated, the contrast picture varies in the sense that the modifications caused by hydronephrosis join the aforementioned arterial variations themselves. The vessels, spread and distributed in the manner of strings on a tennis racket, stretch and grow longer until they become, in extreme cases, very thin, almost capillary. In these circumstances the angiographic diagnosis may meet with difficulty, but it should be borne in mind that the arterial modifications associated with tuberculosis, in contradistinction to those of hydronephrosis, involve limited renal areas of varying size and that, in addition, a more obvious vascular disorder is observable. When the specific process is clearly pyelic, however, the angiographic picture is identical with that of hydronephrosis so far as the disposition of the arteries is concerned (displacement, drawing, etc.), while alterations of the arteries themselves are more sharply accentuated and more clearly evident than in a case of hydronephrosis.

Finally, in the presence of tubercular pseudoinfarct, the angiogram shows a fan-shaped avascular zone departing from an arterial branch of medium caliber, revealing the aspect already described.

The arterial variations shown in the accompanying illustrations require no particular comment to demonstrate the importance of angiographic research in the diagnosis of renal tuberculosis. Certainly they prove that the technic to be used must permit systematic contrast visualization of the whole arterial network, to the most peripheral capillaries, in a clear and selective manner.

With the primary localization, which, as I have pointed out, is clearly cortical, neither urographic nor pyelographic investigation can enable one to make a definitive diagnosis, since lesions of the calyces are secondary. When tuberculosis of one of the kidneys is excluded urographically and the pyelogram demonstrates amputation of a group of calyces, it is almost impossible to differentiate, with any certainty, renal tuberculosis from a primary renal tumor, since cystoscopic study and tests for Koch's bacillus in the urine may give negative results. This is confirmed by my Case 9 (Fig. 2), in which papillary lesions apparently revealed by the cystoscope did not exist; both the pyelographic report and the test for Koch's bacillus gave negative results for the side excluded from the urogram, justifying a well-founded suspicion of the presence of tumor, especially as the patient's history revealed a remarkable loss of weight.

Fig. 5.—Cortical tuberculosis.

Therapeutic Implications.—If angiographic study is important in the diagnosis of renal tuberculosis, it is perhaps still more important in the therapeutic management of the patient. Since it reveals the exact limits of the specific process and the architectural disposition of the vessels, it is a highly useful guide in establishing the extent of surgical demolition that is necessary and, eventually, in performing segmental resection on the basis of exact knowledge, the *sine qua non* for a good result.

CONCLUSION

The value of these brief considerations becomes apparent when one realizes that angiographic study provides the surgeon with a clear vascular picture that can be superimposed perfectly on the anatomic one and that it is essential to obtain contrast visualization of the smallest ramifications, which are, as I have demonstrated, the first to be involved in the tubercular process. Obviously, only selective arteriographic study can supply a perfect arteriographic image; it is the only useful means of arriving at an early and accurate diagnosis of renal tuberculosis. Since it is also innocuous, I consider it worthy to be included in the daily training of those responsible for surgical and urologic diagnosis.

RIASSUNTO

L'impiego dell'arteriografia nella pratica urologica non è ancora così largamente diffuso come meriterebbe a causa delle sue possibili complicazioni. L'autore è del parere, tuttavia, che una scelta accurata dei malati da sottoporre a questa indagine e una meticolosa valutazione di tutti i dati di laboratorio possono ridurre al minimo i rischi in un'alta percentuale dei casi. Egli ha compiuto delle ricerche in una serie di casi clinici e sperimentali di tubercolosi renale, studiati arteriograficamente, e ne riassume i risultati facendo riferimento ad un suo precedente lavoro sullo stesso argomento.

RÉSUMÉ

L'importance et l'usage judicieux de l'artériographie en urologie ne sont pas encore assez pris en considération du fait des complications qu'elle peut entraîner. L'auteur pense cependant qu'une sélection critique des malades et une évaluation précise des données de laboratoire dans chaque cas, élimineraient ces risques dans bien des cas. Il a procédé à l'étude artériographique d'une série de cas expérimentaux et cliniques de tuberculose rénale, et décrit brièvement les résultats, avec références à ses publications antérieures.

RESUMEN

La importancia y uso adecuado del estedudio arteriográfico en la práctica urológica no ha sido todavía aprovechado debido a sus posibles complicaciones. De acuerdo con la opinión del autor la selección cuidadosa de los enfermos y la estimación meticulosa de los datos de laboratorio en cada caso puede eliminar muchos de estos riesgos. Ha hecho diversos estudios experimentales y clínicos de arteriografías renales especialmente en casos de tuberculosis bacilar. Los resultados se sumarizan brevemente y se hace referencia a una anterior publicación del autor sobre esta materia.

SUMARIO

O uso adequado da arteriografia na pratica urologica ainda não é utilisado como deveria ser devido ás possiveis complicações dêsse esudo. Na opinião do A., entretanto, uma seleção cuidadosa dos doentes e a utilisação minuciosa dos achados laboratoriais em cada caso poderão eliminar essas complicações. O A. realisou n'uma serie de casos estudos clinicos e experimentais nos quais a arteriografia renal foi

empregada em conexão com tuberculose renal. Resume brevemente os resultados que concontrou e faz referencia ás primeiras publicações nêsse tópico.

ZUSAMMENFASSUNG

Arteriographische Untersuchungen werden wegen der möglichen Komplikationen in der urologischen Praxis noch nicht entsprechend ihrer Bedeutung gemäss angewendet. Der Verfasser glaubt aber, dass sich diese Risiken durch eine sorgfältige Auswahl der Kranken und durch peinliche Auswertung der Laboratoriumsbefunde in jedem Falle häufig ausschalten lassen. Er hat eine Untersuchung einer Reihe von experimentellen und klinischen Fällen durchgeführt, bei denen arteriographische Untersuchungen der Nieren bei Nierentuberkulose angewendet wurden. Er gibt einen kurzen Abriss seiner Ergebnisse und weist auf seine früheren Arbeiten über dieses Thema hin.

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Small boys are too often the victims of premature surgery. Phimosis should be treated by circumcision, but phimosis is almost unknown before puberty, and circumcision is practised in our hospitals for reasons of religion, folklore, tradition, apprenticeship, or just plain inability to say no, rather than because it is necessary. Every new-born male infant has a long and non-retractile prepuce as a birthright, but he rarely suffers from any obstruction to passing urine or pain in doing so.

—Ogilvie

Coccidioidomycosis of the Spermatic Cord: Roentgen Therapy

Report of a Case

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AND
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COCCIDIOIDOMYCOSIS in the male seminal tract is a rare manifestation and warrants a case report. Up to 1953, excluding autopsy, statistics, 6 instances of coccidioidomycosis involving the seminal tract had been reported in the medical literature. In all of the cases previously reported the condition had been treated by surgical excision. Since unsuccessful excision was followed by radiation therapy with simulated cure, the case here reported has additional significance.

The general features of the disease have been adequately described in the literature. Certain general features, however, bear repetition. The causative agent, *coccidioides immitis*, exists in the soil of Southwestern United States, Northwestern Mexico and certain regions of South America. The arthrospores and chlamydospores developed by the organism in its saprophytic phase are dust-borne. The disease is contracted, therefore, by inhalation. In the human organism the chlamydospores become doubly refractive spherules that are diagnostic of the disease. The coccidioidal complement fixation test, done in mass skin testing programs on persons living in endemic areas, revealed that all members of the population contract the infection at one time or another. In 40 per cent of those exposed to the disease, it varies from a mild infection of the upper part of the respiratory tract to severe pulmonary involvement, and in some instances the disseminated and progressive forms result in death. In approximately one-half of the disseminated infections, progression leads to death. The characteristic lesion is an infectious granuloma, consisting of a group of epithelioid cells with scattered giant cells and, frequently, central caseation. The caseation resembles that associated with tuberculosis. The presence of the double refractile spherules observed in smears of secretion from the involved organs, as well as in tissue preparation, is diagnostic. The disease is disseminated by the blood stream, and the most frequent sites of granuloma are in the lungs, lymph nodes, skin, subcutaneous tissues, liver, kidney, bone, meninges, adrenal gland and myocardium. From exhaustive autopsy data it is apparent that in about 1 per cent of those patients in whom clinical pulmonary disease has existed there is dissemination to other parts of the body. There is usually a long latent period (up to five years) between the primary pulmonary infection and the evidence of involvement of the genital tract.

In an extensive study of 95 cases of proved coccidioidomycosis occurring in Army installations, Forbes and Bestebreurtje, in 1946, observed the organism and disease in the kidney and prostate, but in no other portion of the urinary

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tract. They noted that 60 per cent of the lesions occurred in the kidney and 6 per cent in the prostate. Gibson, however, disclosed the fact that, although the kidney is the most commonly involved organ of the genitourinary tract, in the disseminating type of the disease this rarely became important from the clinical standpoint. Weyrauch et al., in 1950, reported 2 cases of coccidioidomycosis involving the epididymis and probably secondary to a prostatic focus. Rohn and his associates, in 1951, also reported 2 cases of epididymitis due to coccidioidomycosis. Root and Christensen, in 1953, reported 2 additional cases of coccidioidomycosis of the epididymis. Rohn, Davila and Gibson reported, in a series of 214 cases described by various authors, 57 instances of renal involvement, or 26.6 per cent; 4 instances of prostatic involvement, or 1.8 per cent; 2 instances of epididymis, 0.9 per cent, and 1 instance of involvement of the seminal vesicle and testis, or 0.4 per cent. There is no specific therapy for the disease. In all of the reported cases in which the epididymis was involved, surgical excision was done. Sodium or potassium iodide has been suggested for reduction of the granulomatous lesions. The success of this type of therapy is questionable. Thoracic coccidioidomycosis mimics tuberculosis so closely as to suggest the possibility that coccidioidomycosis of the spermatic cord and epididymis may be evident in more cases than is indicated by the literature —possibly, in some instances, a diagnosis of tuberculosis is made. Rhone, Davila and Gibson pointed out that renal infection with coccidioidomycosis has little clinical importance, while genital involvement is important. In our case the apparent involvement of the prostate with coccidioidomycosis was unrecognized, as was the lesion in the spermatic cord. Our diagnosis, "spermatic granuloma," was erroneous.

The authors report a case of unrecognized coccidioidomycosis of the spermatic cord, in which the erroneous diagnosis of "spermatic granuloma" was made. After unsuccessful conservative treatment in various forms, bilateral vasectomy was done to relieve severe epididymitis. A few months later another operation was required, and the "granuloma" was excised. Both operations were followed by suitable after-care, including the treatment of a persistently draining sinus by roentgen therapy. The pathologic diagnosis was coccidioidal granuloma. This was confirmed by the School of Public Health in Berkeley and by the Armed Forces Institute of Pathology. At the time of writing the patient had no active symptoms, but it was planned to administer one of the newer antibiotics in an attempt to prevent reactivation.

REPORT OF CASE

E. J. C., a man 37 years old, a tree-trimmer, was first seen on July 29, 1954 because of urgency and frequency of urination and some dysuria. He had had similar symptoms about a month earlier, which had disappeared spontaneously. Examination revealed the external genitalia to be essentially normal. The prostate was slightly enlarged, and was boggy and tender. No nodules were palpated, and the seminal vesicles were not palpable. The prostatic secretion contained 80 to 100 white blood cells per high power field. There was some tenderness in the right loin but no palpable masses. An intravenous pyelogram was reported as essentially normal.

The patient was treated by prostatic massage, and the symptoms gradually disappeared. On October 26, acute left epididymitis developed. Treatment consisted of the administration of antibiotics, local application of ice

packs and elevation of the scrotum. The epididymitis resolved, then recurred and then incompletely resolved. Bilateral vasectomy was done. The postoperative course was uneventful. Prostatic massage was done in December, January and February. On March 7, 1955, purulent drainage was noted from the site of the left vasectomy incision, which continued to drain in spite of local cauterization. A nodular mass was now palpable. On April 1, excision of what was thought to be a spermatic granuloma was done. The patient was discharged from the hospital on the following day. Healing occurred spontaneously. On April 19, a draining sinus developed over the site of the right vasectomy incision. One week later there was drainage on the left side. On May 6, the patient was given roentgen therapy to a total of 210 r in air to the right and left sides of the upper part of the scrotum; 250 Kv., 1.12 mm. of copper, HVL 15 ma., 50 cm. focal scrotal skin distance. Both incisions healed. On November 10 there was no evidence of any draining fistula. There was a nodule palpable in the left scrotum, but the right was soft and appeared essentially normal.

The pathologic report of Richard Myers, M.D., of the tissue removed on April 1 was as follows: "The specimen consisted of a 4 by 4.5 by 2 by 0.6 cm., irregular mass of rough white tissue. At each extremity of the mass a 1.5 by 0.3 cm. segment of firm tubular structure entered the central portion. At one border an irregular piece of wrinkled skin 1.5 by 1 by 0.05 cm. was attached. Microscopic examination revealed many granulomatous foci. These were characterized by necrosis, round cell infiltration and many giant cells. Fibroblastic proliferation was evident. In addition, there were many round bodies. These had a hyalin capsule and were filled with endospores. They varied from 40 to 60 microns in size, and morphologically were typical of C. immitis. The sections also contained portions of the spermatic cord, with round cells in the wall. There was no evidence of neoplasia. Diagnosis: Coccidioidal granuloma of the spermatic cord."

A specimen of blood was sent to the School of Public Health at Berkeley, California, and was reported as "positive" for disseminated coccidioidal infection. The titer was not as high as frequently observed—much more in accordance with a single extrapulmonary lesion. A specimen of the tissue block was sent to the Armed Forces Institute of Pathology. The diagnosis was coccidioidal granuloma of the spermatic cord. Subsequent careful questioning revealed that the patient had had some pulmonary involvement in November 1953, at which time he required bed rest for three weeks for either pneumonia or a virus infection. He has had no subsequent evidence of pulmonary disease. During the past year (1957) necrosis of several vertebrae became evident on roentgen examination. Severe headaches, in addition to neurologic evidence of irritability of the central nervous system, developed. Progression and dissemination of the disease was obvious. There has been no local scrotal activity of the disease process. At the time of writing (February 1958) the patient is free from active symptoms. Involvement of the vertebral and central nervous system is quiescent. The patient is to receive therapy by one of the newer investigative antibiotics.

ZUSAMMENFASSUNG

Die Verfasser berichten über einen Fall von unerkannter Coccidieninfektion des Samenstranges, wo die irrtümliche Diagnose eines "Samengranuloms" gemacht worden war. Nach erfolgloser konservativer Behandlung verschiedener Art wurde eine beiderseitige Samenstrangexstirpation vorgenommen, um eine schwere doppelseitige Nebenhodenentzündung zu beheben. Einige Monate später wurde eine weitere Operation notwendig, und das "Granulom" wurde reseziert. Nach beiden Operationen erfolgte angemessene Nachbehandlung einschliesslich Röntgenbestrahlungen wegen einer ständig drainierenden Fistel. Die pathologische Diagnose lautete Coccidiengranulom und wurde von der Schule für Öffentliche Gesundheitspflege in Berkeley und vom Pathologischen Institut der Wehrmacht bestätigt. Zur Zeit der Niederschrift dieser Arbeit zeigte der Patient keine aktiven Krankheitszeichen; als Versuch, einer Reaktivierung vorzubeugen, wurde jedoch die Verabreichung eines der neueren Antibiotika geplant.

RÉSUMÉ

Il s'agit d'un cas de coccidioidomycose du cordon spermatique non diagnostiquée et prise pour un granulome spermatique. Après divers traitements conservateurs sans succès, les auteurs pratiquèrent une vasectomie bilatérale afin de soulager une épididymite grave. L'état du malade nécessita une seconde intervention quelques mois plus tard, et le "granulome" fut excisé. Après les deux opérations, soins post-opératoires usuels avec drainage permanent et radiothérapie. Diagnostic anatomopathologique (confirmé par la School of Public Health de Berkeley et le Armed Forces Institute of Pathology) : granulome coccidioidien. Actuellement le malade ne présente plus de symptômes actifs, mais un traitement aux antibiotiques les plus récents est prévu en vue de prévenir un réveil de l'affection.

RIASSUNTO

L'autore riferisce un caso di coccidioidomicosi ignorata del funicolo, nel quale era stata fatta la diagnosi erronea di "granuloma spermatico." Dopo aver tentato senza successo un gran numero di cure, venne fatta una vasectomia bilaterale per tentare di risolvere la grave epididimite. Pochi mesi dopo, tuttavia, si rese necessario un nuovo intervento, e questa volta venne asportato il "granuloma." Entrambi gli interventi furono completati con cure post-operatorie e roentgenterapia di una fistola residua; la diagnosi anatomopatologica fu di "granuloma coccidioidale," confermata da due instituti (la Scuola di Salute Pubblica di Berkeley e l'Istituto di Patologia delle Forze Armate).

Fino al momento della pubblicazione di questo lavoro il malato sta bene; si sta somministrando una serie di antibiotici fra i più moderni per prevenire la recidiva.

RESUMEN

Los autores dan cuenta de un caso de coccidioidomicosis del cordón espermático desapercibido qye había sido diagnosticado herroneamente como granuloma espermático. De varios tratamientos internos que fracasaron se practicó una vasectomía bilateral para curar la epididimitis grave. Algunos meses después fue precisa otra operación para extirpar el granuloma: ambas operaciones fueron seguidas de un tratamiento postoperatorio adecuado incluyendo el tratamiento radioterápico de una supuración persistente. El diagnóstico anatomopatológico fue de granuloma coccidiodomicotico. Esto mismo ha sido confimado por la Escuela de Salud Pública de Berkeley y por el Instituto Anatomopatológico de las Fuerzas Armadas. En el momento presente el enfermo no tiene síntomas pero se está pensando an administrarle alguno de los nuevos antibióticos para prevenir la recidiva.

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Hippocampus Hernia and Its Arteriographic Image

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AND

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ONE of the subjects that provoke great controversy among neurosurgeons is "cisternal hernia." This work reports an anatomic, roentgenographic and clinical study of the communicant and posterior cerebral arteries, the results of which, in our opinion, are of interest.

In a publication on the posterior cerebral artery (1954) we mentioned the embryonic development of the cerebral vascular system at the expense of the cephalic branches and the volume of the internal carotids, pointing out that the posterior cerebral artery is dependent on the posterior communicant. Continuous study of this vessel confirms this conception, assisting us in the interpretation of normal and pathologic vascular images.

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The authors have studied 869 arteriograms of the internal carotid artery in the lateral position, finding injection of the posterior communicant and the posterior cerebral in 147 (16.92 per cent), of which 113 (76.86 per cent) were normal and 34 (23.12 per cent) pathologic. The different roentgen images of these vessels are classified into seven groups.

In a later publication (1955) we showed a diagram in which five 10-degree angles are represented. The angles arise from the tuberculum sellae and radiate to the occipital bone. We studied in this diagram the trajectory of the communicant and posterior cerebral arteries, concluding that the most frequent trajectory of the anterior segment was between 10 and 20 degrees and that of the posterior segment between 20 and 30 degrees.

On the basis of these observations, we proposed to study the different images of these vessels and their relative importance in relation to the hernias of the uncus and the hippocampus.

Material and Method.—We studied the relations and measurements of the Willis polygon in fresh cadavers without a fixation process, obtaining the following results: (1) that the average distance between the carotidean siphon (beginning of the posterior communicant artery) and the posterior cerebral artery was 9 to 11 mm.; (2) that the posterior communicant artery is 13 to 15 mm. long, and (3) that the posterior communicant artery exceeds in length the space it occupies.

Later we established the relation between the posterior communicant and the fifth temporal circumvolution, with the following results: (a) in the anterior third the cistern is wide (8 to 10 mm.); (b) in the middle third the cistern diminishes to 6 mm., and (c) in the posterior third the cistern reaches a width of only 3 mm.

At the back of the last-mentioned area the hippocampus maintains an intimate relation with the posterior cerebral. The length of the posterior cerebral from its beginning at the level of the posterior communicant to the posterior edge of the hole of Pachioni, with a free trajectory in the posterior cerebral, ranges from 35 to 40 mm., in a segment related to posterior hippocampus hernia.

We have made this study by reviewing 869 arteriographic studies of the internal carotid, finding good injection of the communicant and posterior cerebral in 147, or 16.92 per cent. These figures are similar to those found in 1955 in the publication by one of us (Rocca) and Monteagudo, who recorded 16.77 per cent of 477 cases. Apparently, these values are low in comparison to those presented by other authors (Fig. 3, *A* and *B*), which vary between 25 and 35 per cent. According to the nature of our investigation, we discarded all injections that were not sufficiently clear, in order to avoid errors of interpretation.

Examination of the plates in the lateral position revealed that, even if there was diversity of images in the group considered normal, it was possible to detect a certain similarity in some of them. In view of this fact, we tried to group them into various typical groups and were able finally to consider seven types (Fig. 2), the characteristics and incidence of which constitute the principal theme of this article.

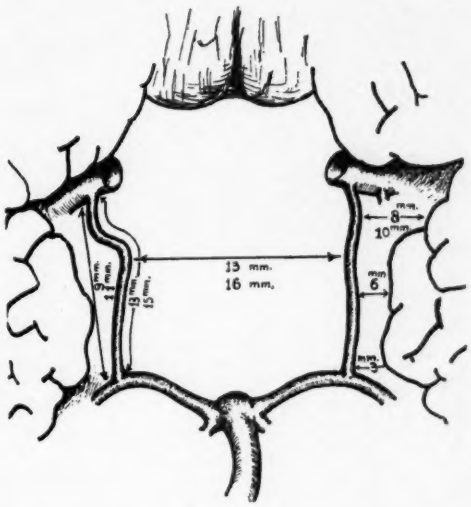

Fig. 1

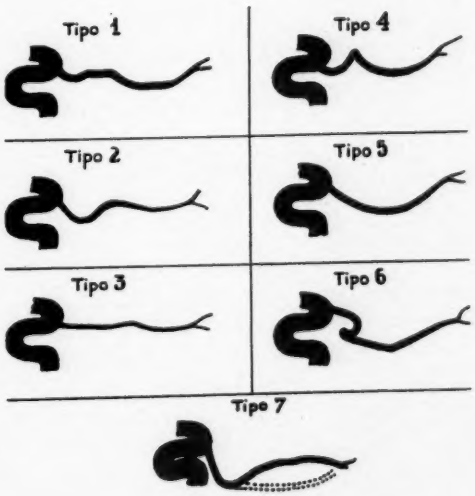

Fig. 2

Results.—We have considered two groups, normal and pathologic. The first consisted of patients who had no encephalic lesions and of whom arteriograms had been taken; the second, of patients with neoformative processes. Of the 147 persons in whose cases visualization of the communicant and posterior cerebral arteries was obtained, 113 (76.86 per cent)

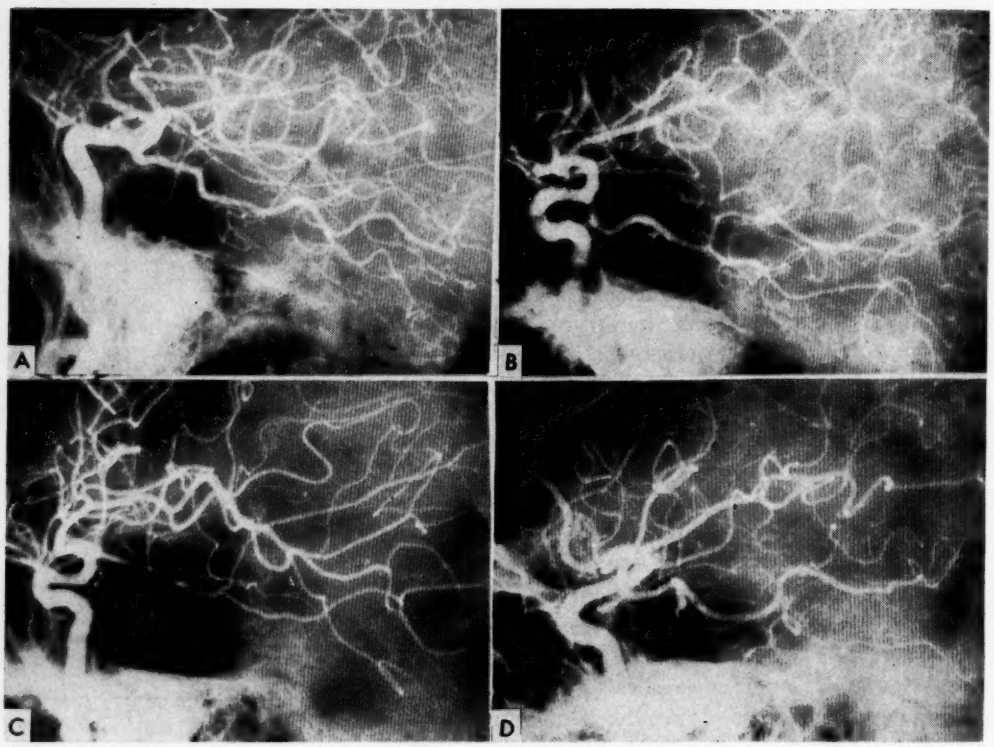

Fig. 3

were normal and 34 (23.12 per cent) pathologic (see table).

Type I. (9 cases, 8, or 5.44 per cent normal and 1, or 0.68 per cent, pathologic) —This type reveals a thick vessel (Fig. 3*A*) with an irregular trajectory on the first stretch, ending in a concave area extended somewhat upward.

	Normal		*Pathologic*		
Type	*Cases*	*%*	*Cases*	*%*	*Total*
I	8	5.44	1	0.68	9
II	13	8.84	5	3.40	18
III	23	15.65	6	4.08	29
IV	42	28.57	9	6.12	51
V	17	11.56	3	2.04	20
VI	10	6.80	5	3.40	15
VII	0	—	5	3.40	
	113	76.86	34	23.12	147

Type II.—This type was observed in 18 cases, 13 normal (8.84 per cent) and 5 pathologic (3.40 per cent). The posterior communicant is thick; its trajectory (Fig. 3*B*) makes a marked cavity upward, of slight extent, more or less rounded and angular. The posterior cerebral presents a second inferior concavity slightly beyond the line of its trajectory, imperceptibly making an italic S and dividing into terminating branches. In more than 50 per cent of the cases it was not possible to establish the difference between the communicant and the posterior cerebral.

Type III. (29 cases, 23, or 15.65 per cent, normal and 6, or 4.08 per cent, pathologic)—A thin vessel is observed (Fig. 3*C*), filiform but with a tendency to be rectilinear, or slightly wavy (sinuous) or

in the form of an obtuse angle widely opened. In no case was it possible to establish the limit between the communicant and the posterior cerebral.

Type IV.—This was the most frequent type (51 cases, 42, or 28.57 per cent, normal and 9, or 6.12 per cent, pathologic). A double concavity is observed (Fig. 3*D*) the

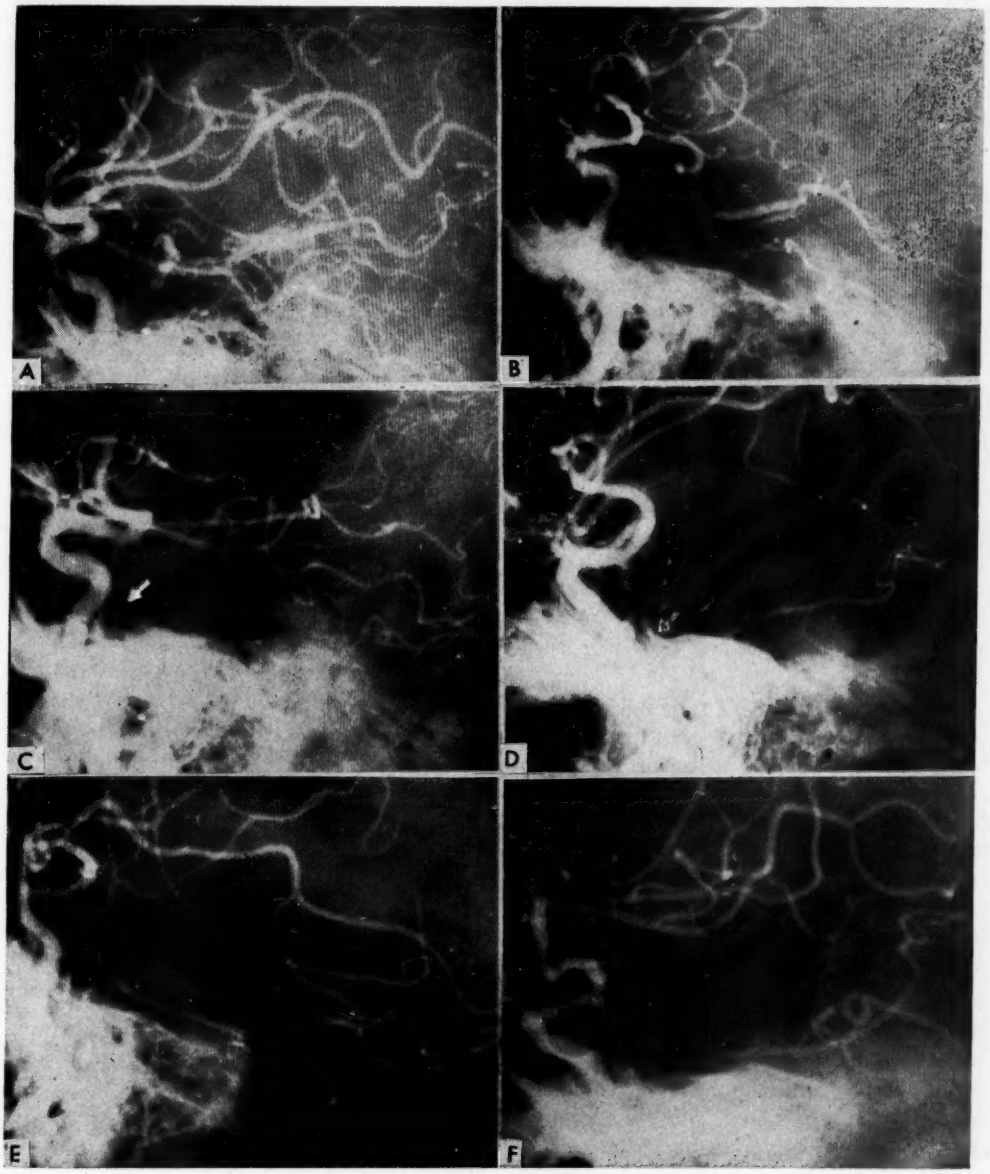

Fig. 4

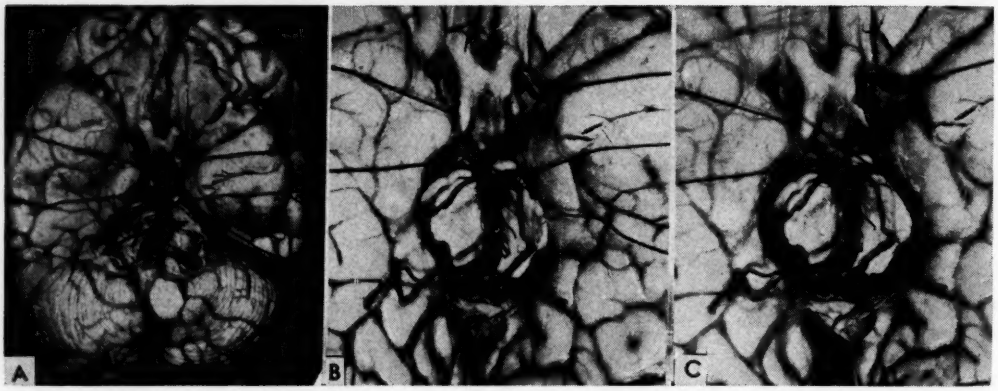

Fig. 5

first concave area is short, corresponding to the posterior cerebral at the level of the hippocampus; the latter is more or less elongated. The vessel is thick throughout its trajectory.

Type V. (20 cases, 17, or 11.56 per cent, normal and 3, or 2.04 per cent, pathologic)—This type is characterized by a thick vessel (Fig. 4*A*) with an open superior concavity, not strongly accented. It is impossible to establish the limit between the communicant and the posterior cerebral.

Type VI. (15 cases, 10, or 6.8 per cent, normal and 5, or 3.4 per cent, pathologic)—In this group the posterior communicant (Fig. 4*B*) has the form of an italic S, whose first concavity is small and not too deep; the second and longer inferior concavity ends in a pronounced form, almost like a hook. Emerging from this point is the posterior cerebral, which makes a great superior concavity.

Type VII.—The last type corresponds to an exclusively pathologic image (5 cases, or 3.40 per cent), with two variations: In the first, the posterior communicant (2 cases) is taken from its beginning downward almost vertically (Fig. 4, *C* and *D*) to form, later, a pronounced concavity more or less long and difficult to see, because it always "gets lost" and is covered by the peñasco. This is the image observed in hernia of the uncus. In the second variety (3 cases) (Fig. 4, *E* and *F*) the descent of the communicant is not so pronounced, and the posterior cerebral makes a long and deep concavity upward; this is the image associated with hippocampus and hernia and is also frequently observed in cases of temporal tumors.

In the great hypertensive syndromes characterized by edema and pronounced protrusion of the uncus and hippocampus, the two images complement each other. We do not mean to say that every arteriogram showing an injection to the communicant and posterior cerebral strictly corresponds with these types. To classify them, it must be borne in mind that the description is based on selected images, which on examination seldom exactly agree with what is described. It is the careful analysis of the actual characteristics that makes it possible to assign it to one of these categories, with rare exceptions.

SUMMARY

The study here reported gave the authors the opportunity to obtain arteriographically typical images that can be applied with great advantage to practical

purposes. The problem of angiographic interpretation involves difficulties, and the frequent variations of the vessels in their trajectories produce capricious images. This is one of the reasons why we tried to classify these trajectories, having been able to separate 7 groups with definite lines.

Histologically, the great cerebral arteries present characteristics that distinguish them from others; they are vessels with scarce muscular fibers, in which elastic tissue predominates, making variation of caliber difficult and offering a rigid but resistant aspect. At the same time, they are longer than the space they occupy, as is shown in Figure 1. This permits their displacement and elongation without loss of caliber.

The trajectory of the posterior communicant artery is in the chiasmatic cistern and that of the posterior cerebral artery in the fissure of Bichat, in a flexible form. Because of the great branches it supplies, it is much firmer than the communicant, but its greater dimensions permit it ample displacement.

The uncus maintains an intimate relation with the posterior communicant, and the greater distance between them corresponds to the anterior third, which means that, in order to displace the artery in this portion, strong edema is required. On the contrary, the posterior third can be rapidly displaced. The hippocampus is in direct relation with the posterior cerebral artery, rejecting it to the midline downward in the presence of edema. The arterial vessel can also be englobed and strongly compressed by the hernia (Fig. 5, *A*, *B* and *C*), having a greater diflexion and a remote possibility of injection. The image produced by great elongation and descent indicates the presence of hernia, but its absence does not eliminate it. As can be seen in the statistical records here presented, it is a frequent observation that in pathologic conditions these vessels continue their trajectories within normal limits.

From this arteriographic study and in accordance with the results obtained, we conclude that the diagnosis of hernia of the anterior and posterior hippocampus is fundamentally clinical; that interpretation of the images of Types I to VI is related to the clinical picture, and that Type VII is almost pathognomonic of cisternal hernia.

Tönnis and Pia expressed the opinion (1952) that the position of the posterior cerebral artery follows a line that passes above the sella turcica but accepts the various modifications to which the artery is subjected. In 54 cases of tumor of the middle fossa they observed descent of the posterior cerebral in 37, with the following characteristics: in 6, total displacement of the artery; in 7, descent of the first portion only, i.e., the posterior communicant, which Niemeyer interpreted as hernia of the uncus. In other cases, descent of the posterior cerebral artery was observed, interpreted by Niemeyer as hernia to the cistern of Galeno.

ZUSAMMENFASSUNG

Die Verfasser haben 869 Arteriogramme der A. carotis int. in seitlicher Projektion untersucht und fanden eine Füllung der hinteren A. communicans und der hinteren Zerebralarterie in 147 (16,92%) Fällen, von denen 113 (76,86%) normal und 34 (23,12%) pathologisch waren.

Die verschiedenen Röntgenbilder dieser Gefässe werden in sieben Gruppen eingeteilt.

RESUMEN

Los autores presentan 869 arteriogramas de la carótida interna en posición lateral encontrando la inyección de la

comunicante posterior y de la cerebral posterior en 147 (16,92 por cento), de los cuales 113 (23,12 por cento) eran normales y 34 (29,12 por cento) patológicos.

Las diferentes imágenes radiológicas de estos vasos se presentan clasificadas en siete grupos.

SUMARIO

Os AA. estudaram 869 arteriogramas da carotida interna em posição lateral conseguindo injetar na comuni cante posterior e na cerebral posterior em 147 casos (16.92%) dos quais 113 (76.86%) eram normais e 34 (23.12%) patologicas. Classificam as diversas imagens desses vasos em sete grupos.

. . . Pain is not the only symptom that may mislead. Vomiting, abdominal distension, and constipation in an old person usually mean obstruction from cancer of the colon, but the same picture is given by uraemia. I have several times been asked to see such patients, but I do not remember one that was not also drowsy enough to suggest the true pathology. Haematemesis should mean organic disease, but the vomiting of large quantities of blood is a well known manifestation of hysteria or malingering, and it may be impossible to prove the deception. I once had such a patient, who repeatedly vomited a chamber full of blood, yet never had a radiological deformity or suffered any drop in her colour index. The bleeding only ceased when her husband was killed in an aeroplane crash. I myself have been led astray by the hoary pitfall of jaundice. A lady was sent home from India, wasted to a skeleton, deeply pigmented, with a large hard liver. To my great relief I found, on opening her, that her obstruction was due not to cancer, but to a large egg-shaped stone in the common duct. After its removal she improved rapidly, but did not regain her colour with the speed I should have liked, and it was not till many weeks had elapsed that I realized that the remaining pigmentation was racial and not icteric.

I do not wish to multiply instances of error, but I would return to my original thesis, that a symptom is misleading in proportion as we make it a leading one. Symptoms should come before us to be put in their place, and when all are marshalled, assessed and allotted to their relative stations, the place of the most clamant is not necessarily that of leader.

—*Ogilvie*

Symphysiotomy in Cases of Aftercoming Arrested Fetal Head

Report of a Case

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THE subject of this article is one I had not expected to bring forth again, since my constant struggle in its behalf has evoked violent objections and criticisms from nearly all of the local specialists. The great satisfaction I have derived from its performance, however, has decided me once again to urge those who have never tried it to do so, and to give due consideration to the valuable opinions of others who have had extensive experience with the procedure. I refer to Zárate's partial symphysiotomy.

Sixty-seven performances of this operation, not one of which I have had occasion to regret, give weight to my opinion. I now present an indication that has aroused considerable doubt; even Zárate preferred to perform this operation prophylactically rather than as an extempore measure.

Brindeau, as early as 1926, pointed out the convenience of symphysiotomy in the presence of arrest of the aftercoming fetal head, "after the maneuver of Champetier de Ribes had failed." He published reports of 2 cases in the *Bulletin de la Société d'Obstetrique et de Gynecologie*, No. 7, in that year. I shall report here a case of my own observation.

The aversion of obstetricians toward symphysiotomy can find no justification; it is a rational, perfect and conclusive operation; rational, because it imitates nature. The infiltration of the symphysis during pregnancy tends to permit distention of the ligament, increasing all the diameters of the inlet during delivery. Symphysiotomy has the same effect, although of course in larger measure, permitting the object of delivery to pass freely and naturally. It is so rational that, with only a relative resting period in bed and without any accessory measures, nature can proceed to the "reconstitutio ad integro" of the region.

It is a perfect and conclusive operation because, when well justified and performed, it gives the obstetrician full satisfaction, saving, with an ease admired by the performing physician, the life of a fetus already at the point of death.

REPORT OF CASE

M. R. P., a white married secundigravida aged 29, a resident of Juiz de Fora, was admitted at 8 a.m. on May 2, 1953, to the Ma-

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ternity Ward Terezinha de Jesus, where I examined her.

Obstetric History.—Two years prior to admission, after a normal gestation and without antepartum examination, the patient was in labor for fourteen hours, assisted by a "practical nurse," before deciding to call in a neighborhood physician. By a difficult forceps extraction she was delivered of a living child, who died two hours later. The final menstruation preceding her present pregnancy had occurred August 10 to 14, 1952. She had remained in perfect condition throughout the gestation, and, although she could have obtained free medical advice through her husband's affiliations, she made no use of this prerogative. She had intended and desired again to be delivered of the child at home, but after several hours of labor one foot of the fetus appeared in the vagina. The "practical nurse" became frightened, and the parturient was then brought to the Maternity Hospital.

Physical Examination.—The patient was of a brevilinear habitus in good general condition, though nervous and frightened at the prospect of losing her second child. The pulse rate was 90; the temperature 36.8 C, and the blood pressure maximum 11 and minimum 6. Breech presentation was obvious, with torsion of the cord and the right fetal foot visible in the vulva, though the fetal heartbeat was normal.

Treatment.—Since the fetus was endangered by the dystocia, I decided to act at once. To the instruments I generally use for breech presentations was added a scalpel I always use for symphysiotomy; this is a routine preparation for dealing with such presentations.

Intravenous anesthesia was induced with Evipan. With the assistance of Dr. Jesus Masini I performed a podalic extraction. The trunk and arms "came loose" with ease, but the head became wedged in the inlet, resisting the several maneuvers we attempted. The fetus was already suffering, and we decided to perform symphysiotomy.

As usual, the operation was performed and concluded within the lapse of approximately one minute. Slight traction in the feet completed the descent and delivery of the child, which was in respiratory syncope, with very slow heartbeats. Artificial respiration, oxygen and venous lobeline were administered, and in a few minutes both the respiratory and the cardiac rhythm became normal. The fetus weighed 2,800 Gm. The cephalic diameters were normal.

The puerperium was totally afebrile and asymptomatic. The mother left her bed in a few days and was walking without any difficulty by the tenth day, ascending and descending stairs with entire ease.

I have had 3 similar cases, in 1 of which the fetus could not be revived, although it was born with visible heartbeats.

The aftercoming head, arrested in the inlet, is the principal cause of the high fetal mortality rate associated with pelvic presentations. Faced with this frequent, difficult and amotile situation, no obstetrican should disregard an operation that can correct the dystocia without physical harm to the maternal organism. When the life of the child hangs on the thread of a small technical detail, professional responsibility requires the surgeon to take advantage of a procedure without which he is helpless to save it. When all maneuvers for liberation of the fetal head have failed and the fetus is still alive there remains but one solution, delicate but simple, harm-

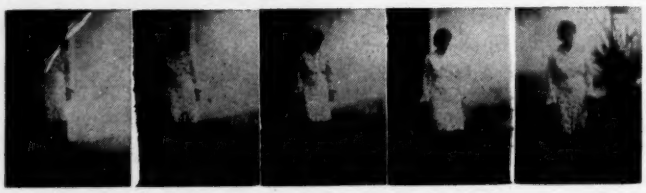

Fig. 1—Photographs taken on the eighth day after symphysiotomy.

Fig. 2.—Roentgenogram taken fifteen days after last labor.

less when performed with the proper technic, and brilliant, because it is life-saving — symphysiotomy. The Zárate partial symphysiotomy technic is an essential part of every obstetrician's professional knowledge and skill.

North American obstetricians frequently resort to the use of Piper's forceps in cases of aftercoming arrested head. This has resulted in a fair number of successes, but only, of course, when there is no disproportion. Knight and O'Connell, of the Sloane Hospital for Women in New York, have published an article entitled "A Ten-Year Analysis of Breech Presentations, 1938-1948," in which, of the 12 full-term fetuses delivered dead or dying shortly after birth, 11 were subjected to autopsy. In only 1 were there no endocranial lesions. All the others presented one or several serious lesions of the brain. In 9, ruptures of the tentum cerebelli were observed (*American Journal of Obstetrics and Gynecology*, November 1952). This precise and early indication for symphysiotomy lends added force to the declaration made by Manuel Rodríguez López at the Congress held in Montevideo in 1949 that "it (symphysiotomy) should figure in the surgical-tocological preparation of every complete specialist who wishes to master the obstetrical art."

It is of interest to record the fact that on October 15, 1954, after two hours of labor, the patient in the case here reported gave normal birth to a fetus weighing 2,900 Gm.

ZUSAMMENFASSUNG

Die Abneigung der Geburtshelfer gegen den Schamfugenschnitt ist voellig unberechtigt; er stellt einen logischen, vollkommenen und entscheidenden Eingriff dar. Er ist logisch, weil er die Natur nachahmt. Die waehrend der Schwangerschaft auftretende Infiltrierung der Schamfuge ist dazu geeignet, eine Streckung des Ligaments zu ermoeglichen, wodurch waehrend der Entbindung alle Durchmesser des Beckeneingangs vergroessert werden. Der Schamfugenschnitt fuehrt zu dem gleichen Resultat, nur natuerlich in weiterem Ausmass, und gestattet eine freie und natuerliche Passage des Foetus. Der Eingriff ist so natuerlich, das nach verhaeltnismaessig kurzer Bettruhe und ohne weitere Hilfsmassnahmen die "reconstitutio ad integrum" des Operationsgebietes einsetzen kann.

Der Eingriff ist vollkommen und entscheidend, weil er bei klarer Indikation und guter Ausfuehrung dem Geburtshelfer volle Befriedigung gewaehrt und das Leben des dem Tode schon nahen Foetus mit einer Leichtigkeit rettet, die die Bewunderung des die Operation ausfuehrenden Arztes herausfordert.

RÉSUMÉ

Les préjugés des gynécologues à l'égard de la symphyséotomie ne sont nullement justifiés; c'est une opération rationnelle, parfaite et probante. Elle est rationnelle en ce sens qu'elle imite la nature. L'infiltration de la symphyse durant la grossesse contribue à la distension des ligaments, augmentant tous les diamètres du bassin pendant l'accouchement. La symphyséotomie aboutit au même résultat—quoique dans une plus large mesure, bien entendu —permettant le passage libre et naturel de l'enfant. Cette technique est si logique qu'une période relativement courte de repos au lit, sans autre mesure accessoire, suffit à permettre une cicatrisation locale complète.

La symphyséotomie est concluante, car lorsqu'elle est justifiée et correctement exécutée, elle satisfait à toutes les exigences de l'opérateur et permet de sauvegarder in extermis, avec une simplicité admirable, la vie du foetus.

SUMARIO

Diz que não se justifica a aversão dos obstetras á sinfisiotomia que considera uma operação racional e perfeita. Racional porque imita a natureza. A infiltração da sinfise permite distender o ligamento aumentando todos os diametros durante o parto, tal como acontece com a sinfisiotomia mais amplamente permitindo uma delivrance facil e livre.

Racional tambem porque apenas o repouso no leito permite uma restituição dos tecidos á sua integridade. É uma operação perfeita e conclusiva porque bem praticada concede resultado satisfatorio no momento em que a vida do feto pereclita.

RIASSUNTO

L'avversione degli ostetrici per la sinfisiotomia non è giustificata; si tratta, infatti, di un intervento razionale, perfetto e utile. Raziorale perchè imita la natura; la infiltrazione della sinfisi durante la gravidanza consente la distensione dei legamenti e l'aumento di tutti i diametri dello scavo durante il parto. La sinfisiotomia ha lo stesso effetto, naturalmente in misura maggiore, e consente al prodotto del concepimento di passare liberamente e con naturalezza. E' così razionale che il semplice riposo a letto senza alcun altro provvedimento consente la spontanea reconstrutio ad integrum della sinfisi.

Si tratta di un intervento perfetto e utile perchè, quando è indicato, dà piena soddisfazione all'ostetrico e consente in molti casi di salvare la vita del feto in pericolo, con una facilità che stupisce.

RESUMEN

No tiene justificación la averisón de los tocólogos respecto a la sinfisiotomía; es una operación racional porque imita a la naturaleza. La infiltración de la sínfisis durante el embarazo tiende a permitir la distensión del ligamento aumentando todos los diámetros del estrecho durante el porto. La sinfisiotomía tiene el mismo efecto aunque en mayor medida, permitiendo un paso más libre y natural. Es racional porque requiere solo un período de tiempo muy corto en cama durante el cual, sin medidas especiales, la naturaleza procede al "reconstitutio ad integro" de la región. Es una operación perfecta y concluyente ya que cuando bien justificada y llevada a cabo proporciona al tocólogo satisfacción completa salvando la vida del feto ya a punto de morir.

The hardest conviction to get into the mind of a beginner is that the education upon which he is engaged is not a college course, not a medical course, but a life course, for which the work of a few years under teachers is but a preparation.

—Osler

The Surgical Treatment of Painful Spasm

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In cases of nonprogressive flexion spasms good results may be obtained by mechanical devices that apply powerful correcting forces two or three times daily for periods of about thirty minutes each.

In cases of severe involvement, operation by one or all of the following procedures may give excellent results: obdurator neurectomy; division of the tendon of the iliopsoas muscle; transplantation of the hamstring tendons to the back of the femur; division of the nerves to the gastrocnemius muscle, and section of the achilles tendon.

These combined operations can be used to give great relief to patients with flexion contractures and spasms due to disease of the spinal cord.

PAINFUL spasm is a most distressing feature in many cases of disease of the spinal cord. It interferes with sleep and often prevents sitting in a chair. The patient is in many cases afraid to move lest this precipitates further painful contractions.

In the early stages the deformity can be passively corrected. If it is allowed to persist, however, secondary contracture will occur and extensive orthopedic procedures become necessary to correct the fixed deformity.

It is most important, therefore, in the management of disease of the spinal cord, that no position of deformity should be allowed for more than short periods and that flexion of the hips and knees should be corrected by the patient's lying prone for a period each day, the feet being supported in the neutral position. Adduction of the hips should be corrected by firm pillows placed between the legs.

Correction of Contractures.—Once contractures have formed, it is necessary to introduce some extra mechanical force to counter the deforming effect of the muscles involved. There are many different ways in which this can be done, but the following principles may be identified:

1. Prolonged gentle pressure by springs, traction or turnbuckle plaster is not usually suitable, because the skin will not tolerate the forces required.

2. The skin will, however, tolerate great pressure for limited periods. If skillfully applied, such pressure constitutes a very powerful means of countering and correcting flexion contractures. Thus, a pressure of 100 pounds (45.4 Kg.) applied by a sling to knee or ankle is well tolerated for thirty minutes three or four times daily, and this can with advantage be followed by a period of lying prone.

3. One very effective method of pulling out the contracture that often develops at

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the knee is to place the patient prone and to hang a weight on the heel, which projects beyond the end of the mattress. This effect is increased if vertical upward pull is exerted on the knee through a sling-and-pulley system connected to a weight.

4. Heavy weights might, however, in certain circumstances tear through some of the contracted tissues; so the method described by Russell and Schuster (1951) is safer because the amount of pull is measured and, if the tissues give away, the strength of the traction is immediately decreased.

Thanks to the devoted work of both physiotherapists and nurses, these and other similar methods have had some striking successes, but in the worst cases several months' treatment has been necessary to pull out the contractures.

Surgical Operations.—Attempts to correct flexion contractures by operation have encountered difficulties. Thus division of tendons is often disappointing, and rigid splinting to maintain improved posture after operation may cause necrosis of the skin unless the procedure provides sustained reduction of the flexor spasms.

It must also be appreciated that discomfort from the surgical incision stimulates flexion spasms vigorously, and the results in the past have often been disappointing.

Division of the obturator nerves, however, gives striking relief to the patient in whom severe adduction spasms develop.

A striking success has been achieved recently by a combination of operations including neurectomy, tenotomy and tendon transplant. The groups of muscles most amenable to surgical treatment are the adductors and flexors of the hip, the hamstrings and the calf muscles, and the operations used include the following procedures:

1. *Adduction and Flexion of the Hip:* Obturator neurectomy (Stoffel, 1912) alone will relieve adductor spasms, and in cases of bilateral involvement without contracture the abdominal approach is used. In the cases I have observed, however, there is usually contracture of both the adductors and the hip flexors, and for this to be relieved it is necessary to divide the tendon of the iliopsoas muscle to relieve shortening or spasm of this muscle. An incision is made over the tendon of the adductor longus and brevis muscles are separated from their bony attachments, and the anterior and posterior divisions of the obturator nerve are then divided. By following the upper border of the adductor magnus muscle one is led to the point of insertion of the ilopsoas muscle, which can then be divided. In closing the wound, the origins of the adductors are not sutured back into place. After operation gentle assisted abduction and extension, combined with the patient lying prone, are employed on the day after the operation. Standing out of bed is begun on the third day.

2. *Flexion of the Knee:* The insertions of the biceps, semitendinosus, semimembranosus and gracilis muscles are transplanted to the femoral condyles by the technic of Eggers (1952). This may be combined with section of the branches of the posterior tibial nerve to the gastrocnemius muscle. After this operation a plaster is well tolerated; it is applied from the groin to the toes. This is removed after two weeks, and active extension of the knee is begun by the patient, together with lying prone.

3. *Spastic Equinus:* This condition can often be relieved by simple tenotomy of the *tendo Achilles.* This operation causes a shuffling gait with loss of spring in the foot, but this is of little importance to chair-ridden patients. This procedure may not only relieve painful spasms but enable the patient again to walk a little, with assistance.

Illustrative Cases.—The following case

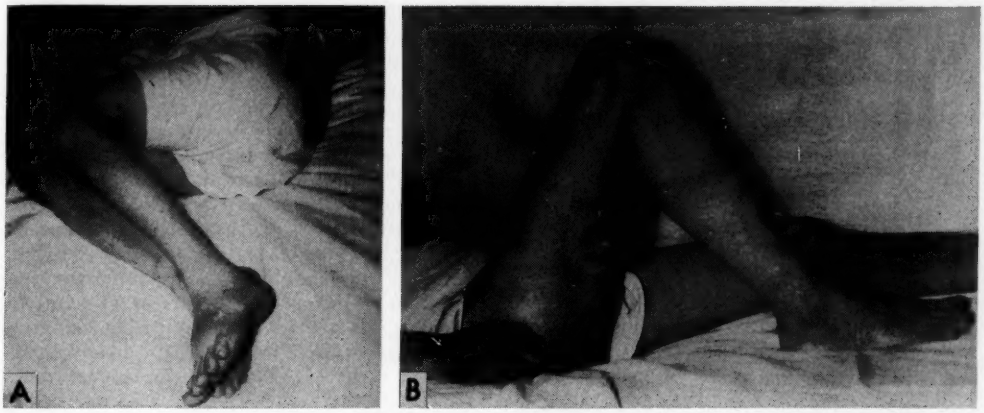

Fig. 1.—Patient in Case 1 after first operation, showing degree of spasm in right leg. In *A* the left leg has been placed in the position it occupied before the operation; *B* shows the degree of correction obtained.

reports illustrate the outstanding advantages of selecting a combination of these operations in cases in which there is no response to simple nonsurgical methods.

REPORT OF CASES

CASE 1.—A man in whom multiple sclerosis presented with difficulty in walking occurred in 1937, at the age of 24, walked sufficiently well to be accepted into the Army in 1939 but was invalided in 1941 because his legs had become weaker. From that time onward he became steadily worse, and he last walked in 1952, with assistance. In that year there was an episode of weakness in the left arm, which did not recover completely and so added to the patient's disability. He remained at work as a clerk, using an electric chair outside and a wheel chair indoors. By 1957 flexor spasms of the legs had become so severe that it was difficult for him to sit in a chair. The movement and pain caused by these disturbed his sleep and greatly impaired his efficiency at work.

On admission to Stoke Mandeville Hospital on Aug. 6, 1957, for assessment, he obviously had severe discomfort and pain during the spasms. He was demoralized by lack of sleep and appeared tired, pale and older than his years. The positive signs present were nystagmus on lateral and vertical gaze, severe spastic weakness of the left arm with sensory loss of the posterior column type; spastic chest and abdominal muscles, and spastic paraplegia with a tendency to flexion contractures. Flexion withdrawal of both legs was induced by even a light touch on the foot. There was little adduction spasm. By firm manual restraint the knees and hips could be extended to a minimum of 15 degrees of fixed flexion.

Operation on the left leg was done on August 16, with general anesthesia and relaxants. The tendons of the biceps and semimembranosus muscles were implanted into the posterior aspect of the femoral condyles, and the nerves to the calf muscles were divided. The tendon of the semitendinosus muscle retracted so vigorously into the wound that it could not be implanted. A plaster-of-paris cylinder was applied to the limb from the groin to the toes.

Postoperatively, incisional pain caused a temporary increase in spasms, but these were reduced by administering pethidine, and they became much less distressing after four or five days. The plaster was removed a fortnight after the operation. The incision and the skin were in excellent condition. There was a striking relief of pain three weeks after the operation. The pattern of the spasm had altered completely, and the frequency was much less. There was no flexion of the knee during a spasm. The quadriceps was observed to contract, but this was not painful. The spasm at the hip was less and no longer uncomfortable. There was little change in the right leg, but the patient could sleep prone for much of the night, which had been impossible before the

Fig. 2.—Patient in Case 1 commencing to walk in walking aid. Legs are supported by plaster.

operation. On discharge (September 16) he was just beginning to stand again, with assistance. He was deliberately discharged to avoid too long an interruption in his employment.

Follow-up.—When the patient was next seen, on October 2, he was distressed by spasm in the other (right) leg and pleaded for similar operation on this side also. This was done on November 8, the procedure being identical with the first except that it was possible on this occasion to implant the tendon of the semitendinosus muscle in addition to the others.

Postoperatively, pain made the spasms worse for a time, but the end result was the same as that achieved on the left side. The patient's general condition improved and he began to sleep well again. At the time of writing both legs are still subject to slight flexion spasms at the hips, but the amplitude of the movement is small. The patient can sit comfortably in a chair and can lie prone quite easily. He stood again, with support four weeks after the second operation. In March 1958 the improvement was well maintained and he was again at work.

CASE 2.—Multiple sclerosis occurred in 1939 in a woman aged 29, with paresthesias in the right arm and leg, stiffness, aching and weakness of the right leg and weakness of the right hand. From 1939 until approximately 1954 there was a remarkable series of fluctuations and relapses, often with considerable remission in the intervals. From 1954 the disability increased steadily because of increasing paraparesis, with frequent flexion spasms causing severe pain in the legs and the lower part of the back. In 1954 she would walk several miles and do all her shopping. In the three months before her admission her walking became much worse.

On admission to Stoke Mandeville Hospital on Aug. 25, 1957, at the age of 47, she could walk a few steps with assistance. She complained of stiffness and pain in all the muscles from her waist downward. She had difficulty in winding a watch, and her handwriting had deteriorated considerably.

On examination she was mildly euphoric and loquacious. The right fundus was pathologically pale. She read J1 with each eye. She had a slightly enlarged left pupil and slight left ptosis, but the external ocular movements were full. Slight left facial weakness, minimal ataxia on the finger-nose test and slight impairment of fine finger movement were noted. The deep reflexes in the arms were increased except for diminution of the right supinator jerk. Sensation was impaired and was mainly due to moderate loss of posterior column function. The abdominal reflexes were absent, and the lumbar and abdominal muscles were slightly spastic. A partial sensory level was found at the eighth thoracic dermatome, with mild loss of perception of all modalities below this. Her legs showed severe spastic paraparesis, with painful and distressing spasms of forced flexion and adduction. When these came on, the patient had considerable pain in the lower part of the back. The deep reflexes were increased and ankle clonus and extensor plantar responses were observed. The general condition of the patient was fair except for mild anemia (76 per cent hemoglobin, or 11.2 Gm.), but she looked tired and unwell.

Progress: The patient unfortunately acquired influenza during treatment, soon after admission, and this kept her in bed for a few days, during which she lost ground rapidly and flexion and adductor spasms became dominant over her weak powers of extension. Progress with physiotherapy was so slow and she had such considerable distress and pain with the spasms that it was decided to operate.

Operation: On November 8, with the patient under general anesthesia, the deformities of the hips and knees spontaneously disappeared, and there was little or no evidence of contracture. An incision was made over the tendon of the adductor longus muscle on each side. The tendon was divided from its point of origin and turned down to expose the anterior branch of the obturator nerve. One inch (2.5 cm.) of the nerve was resected. The point of origin of the adductor brevis muscle was then divided and the muscle turned down to expose the posterior division of the nerve, which also was divided. By following the upper margin of the adductor magnus muscle the point of insertion of the iliopsoas muscle was identified; it was observed to be contracted and was divided. The patient was then turned on her face. An S-shaped incision was made over the popliteal fossa and the upper part of the calf on each side. (This type of incision is used to prevent subsequent contracture of the scar.) The insertions of the semitendinosus, semimembranosus, gracilis and biceps femoris muscles were identified and divided. The first three tendons mentioned were transplanted into the posterior aspect of the medial femoral condyle and the last named tendon into the lateral femoral condyle. The motor branches arising from the posterior tibial nerve and supplying the soleus muscle were identified and divided. The wounds were then closed, but no attempt was made to reattach the adductor origins. The knees were immobilized in the straight position by padded plaster cylinders.

Postoperatively there was incisional pain of some severity that caused increased spasm for about ten days, and pethidine was required frequently to control this. After the plasters were removed, however, the incisions were observed to be in excellent condition, and the patient began to improve. As in Case 1, perhaps the most striking improvement was in her general appearance. This improvement was parallel with the lessening of her pain. Flexion spasm was replaced by extension spasm, which was not distressing. She began to stand with plasters about three weeks after the operation and can now, at the time of writing, five months after the operation, manage a few steps with assistance.

COMMENT

In Cases 1 and 2 there is progressive disease of the nervous system, with no prospect of a good recovery of crural functions, and for the patients in these cases a combined operation was employed, to deal with all the main muscle groups affected. This operation not only divided or

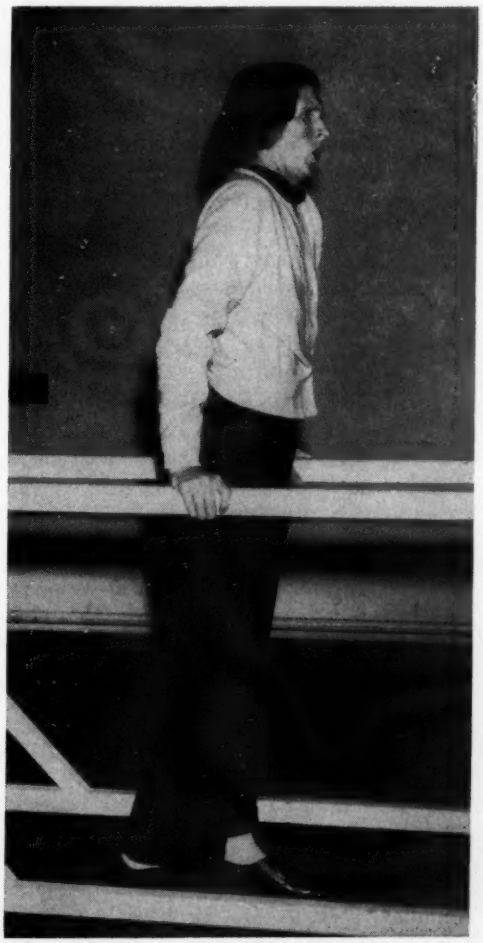

Fig. 3 (Case 2)—Patient walking between bars.

paralyzed the muscles, causing deformity, but converted the hamstring muscles from knee flexors to thigh extensors. The early postoperative results are most gratifying and much better than have been achieved here by other means. Relief of both pain and spasm is most noticeable, and there is every indication that this type of operation can keep these unfortunate patients much more comfortable and active than would otherwise be possible.

Author's Note: I should like to thank Dr. W. Ritchie Russell for his stimulating cooperation and the physiotherapists and nursing staff of Stoke Mandeville Hospital for their care and help in the management of these cases.

RÉSUMÉ

Dans certains cas de spasmes en flexion non progressifs de bons résultats peuvent être obtenus par des procédés mécaniques, exerçant de puissantes forces correctives (30 minutes deux ou trois fois par jour).

Dans les cas graves une des opérations suivantes (seules ou associées) peut donner d'excellents résultats: neurectomie de l'obturateur, division du tendon du psoas iliaque, transplantation tendineuse, division des nerfs du muscle gastrocnémien et section du tendon d'Achille.

Ces opérations combinées peuvent être utilisées en vue de soulager les malades atteints de contractures en flexion et de spasmes dus á une affection de la moëlle épinière.

RIASSUNTO

Nei casi di spasmo in flessione stabilizzato si possono ottenere buoni risultati per mezzo di apparecchi che applicano trazioni 2/3 volte il giorno per periodi di circa mezz'ora.

Quando la lesione è grave, si possono ottenere risultati eccellenti con uno dei seguenti metodi: neurectomia otturatoria, sezione del tendine dell'ileopsoas, trapianti tendinei, sezione dei nervi del gastrocnemio, sezione del tendine di Achille.

Questi interventi combinati possono portare un grande vantaggio nelle contratture in flessione da lesioni midollari.

ZUSAMMENFASSUNG

In Fällen von nicht progressiven Beugungsspasmen lassen sich durch die Anwendung mechanischer Vorrichtungen, die zwei- oder dreimal am Tage 30 Minuten lang eine starke korrigierende Kraft ausüben, gute Erfolge erzielen.

In schweren Fällen kann chirurgische Behandlung durch Ausfuhrung einer oder aller der folgenden Eingriffe ausgezeichnete Resultate hervorbringen: Resektion des Obturatornerven, Durchtrennung der Sehne des Iliopsoasmuskels, Transplantierung der Kniebeugesehnen auf den Oberschenkel, Durchtrennung der zum Gastrocnemius führenden Nerven und Durchschneidung der Achillessehne.

Eine Kombination dieser Operationen kann zur grossen Erleichterung von Patienten mit Beugungskontrakturen und Beugungskontrakturen und Beugungsspasmen als Folge von Erkrankungen des Rückenmarks führen.

RESUMEN

En los casos de espasmos de flexión no progresivos pueden obtenerse buenos resultados con dispositivos mecánicos que aplican fuerzas correctoras dos o tres veces al día en aplicaciones de unos 30 minutos.

En los casos graves pueden obtenerse buenos resultados por cualquiera de estas operaciones: neurectomía del obturador, sección del tendón del psoas-ilíaco, transplantación de los tendones de la pata de ganso o del biceps, sección de los nervios de los gastrocnemios o sección del tendón de Acquilies.

Pueden usarse combinaciones de estas operaciones para aliviar considerablemente a enfermos con espasmos o contracturas de flexión consecutivas a enfermedades de la médula espinal.

SUMARIO

Nos casos de espasmos não progressivos de flexão tem sido obtidos bons resultados por meios mecanicos que aplicam forças potencialmente corretas por 2/3 veses diariamente em periodos de cerca de trinta minutos.

Nos casos de comprometimento grave a operação por um dos metodos po, dera dar excelentes resultados: secção do tendão do psoas iliaco; transplante do costureiro para a face posterior do femur; secção dos nervos dos gastrocnemicos ou secção do tendão de Achiles.

Tais operações combinadas podem seu empregadas para dar grande alivio aos pacientes que apresentam contraturas em flexão e espasmos devidos a molestias da medula.

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The Arabs organized pharmacy, establishing two types of pharmacists: those who sold herbs, sirups, and simple medicines, and those who filled medical prescriptions. Arab pharmacies were supervised by an inspector who threatened the pharmacists with bodily punishment if they adulterated their drugs. Pharmacies were clearing houses for over five hundred drugs, not including their combinations . . . They also sold civet to Moorish women, and distilled water of orange blossoms, myrtle, roses, and carnations for physicians to wash their hands. And they sold honey, then the most fashionable medical panacea, in the form of sirups which are still used today.

The pharmacies were also centers of information, conversation and culture, dispensers of news, gossip, and rumors, and popular academies where people were informed of medical progress. Many Arabic words, which were later incorporated into our language, viz., alcohol, drug, alkali, sirup, sugar, spinach, alfalfa, admiral, arsenal, pillow, cipher, star, algebra, zero, zenith, and julep, were created during the interminable conversations held between the pharmacist and his customers while they gazed at the spurting waters in the blue tile fountains.

Marti-Ibañez

Plastic and Reconstructive Surgery

Ischemic Contracture of the Forearm and Hand

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SAO PAULO, BRAZIL

IN a recent case, severe ischemic contracture of the forearm and hand appeared soon after one unpropitious injection of Chlorpromazine. A boy aged 19 was admitted to the contagious disease section three weeks after a dog bit his right hand.

The patient was so excited at the moment of the admission that the nurse may have injected the chemical substance under the fascia, in the vicinity of the ulnar nerve or around the brachial artery near the anterior elbow crease.

The patient recovered within a couple of days and was discharged after all laboratory tests had given negative results. Three months later he came to the outpatient clinic complaining of considerable weakness of function in the right thumb and complete impossibility of using the right hand, the last three digits of which were almost entirely fixed in flexion. It was noted then that there was paralysis of all muscles below the elbow and that sensitivity was absent in the median and ulnar superficial areas.

The intrinsic muscles of the hand were also paralyzed, and this produced a claw-hand type of deformity. The subcutaneous tissue was very hard, with first-degree stiffness of all the finger joints, and the whole extremity was pale and cold.

The clinical appearance was that of Volkmann's contracture, but one could not understand at once how it had happened without a history of compression of the artery or the nerves by any kind of bad splintage, by fracture or by some other type of injury.

The myoelectric test had revealed total denervation of the forearm and muscles innervated by the median and ulnar nerves.

The wrist flexors were tested by asking the patient to flex the wrist slightly against resistance applied at the level of the metacarpal phalangeal joint of the

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The author reports a recent case of severe ischemic contracture of the forearm and hand of a boy aged 19, whose hand had been bitten by a dog three weeks prior to his admission to the hospital. The contracture appeared soon after a single intravenous injection of Chlorpromazine. The appearance was that of a Volkmann's contracture. Operation was performed in two stages, with an interval of two months. Although definite improvements have been obtained, it is possible that further surgical intervention will be required after sufficient time has elapsed to indicate clearly the type of additional treatment most needed by the patient.

thumb. The wrist movements were limited to 30 degrees, with severe contracture of the fingers, a slight radial pulse and loss of sensation in the five digits. The right hand was painful and really useless (Fig. 1).

The cause of Volkmann's contracture has been extensively discussed since Volkmann, in 1881, suggested incorrect bandaging. Murphy and Brooks reported in 1914 the venous occlusion; Molonguet and Seneque in 1928 emphasized the responsibility of subfascial hematoma. Leriche, in the same year, pointed out changes in the muscles similar to those associated with cardiac and pulmonary infarction. In 1935 Griffiths gave an account of the presence of edema in a neighboring fascial area, and Nassart pointed out that muscles were infiltrated by aerohemorrhagic exudate.

According to Cahuzac and Iung (1946) and Marino (1946) considered the responsibility of arterial stress by traumatic factor proposing the sympathectomy or nerve block to overcome the vascular spasm. Iselin (1955) had established the nerve lesions as the only responsible cause of the intrinsic muscle paralysis and tried to explain the claw deformity by attributing it to ischemic degeneration. Seddon (1956) reported that necrosis is due to arterial occlusion and in 1957 emphasized the presence of edema alone in a neighboring aponeurotic area. Benjamin (1957) also considered edema an important pathologic factor in the swelling of the muscles associated with ischemic contracture. He suggested that "tension from edema in a neighboring fascial area may be the stimulus that maintains the spasm." This situation was well observed and demonstrated in his 3 personal cases and in my patient, in whose case decompression of the edema helped in restoration of the arterial circulation.

It seems clearly reasonable that contracture will occur if a certain degree of ischemia persists for an adequate time. I was not able to find any reference to the action of 3-hydrochloride-dimetilamino-3-propil-10 (Fenotiazin) as a chemical agent responsible for such severe ischemic degeneration of the muscles and peripheral nerves.

The flexor muscles, affected by oxygen deprivation combined with infiltration, presented several structural changes. Initially they became indurated and lost their elasticity; later the increasing fibrosis of the serum exudate changed the muscles into an atrophied, contractured mass.

What determines the later development of Volkmann's contracture seems to be the severe venous engorgement and fibrosis, producing ischemia.

Soon after the appearance of the arterial spasm, anoxia due to a diminished blood flow, as Cohen (1940) noted, causes increased capillary permeability and exudation of fluid. Shortly thereafter, pressure in the flexor muscles of the forearm is increased, because these muscles are enclosed by unyielding fascia.

A vicious circle is set up in such a case, in which increased tension maintains the arterial spasm and the consequent ischemia aggravates the edema; hence the tension in the fascial area.

My patient had flexion contracture of the digits for several months, during which the flexed wrist showed a typical deformity. The later effects of fibrosis in this case were paralysis of the median and ulnar nerves and complicating lesions resulting in severe disturbance of the intrinsic muscular balance of the whole hand.

The affected zone, however, differs in shape and distribution of tissue changes, as was observed in the specimen examined. During the first operative examination it was hardly possible to distinguish the muscular damage due to ischemia from that produced by the degeneration of nerve fibers. I did keep in mind, however, the fact that peripheral nerve tissue is mani-

festly less susceptible to anoxia than are muscles. It is conceivable that in the presence of mild ischemia the nerve fibers undergo wallerian degeneration early.

The paralysis of the median and ulnar nerves was well tested and the etiologic factors investigated in the case here reported, and the only answer, apparently, was that Chlorpromazine was responsible for the degenerative changes.

Reflex contracture and infectious diseases were also investigated, and the deformities produced by paralysis of the lumbrical and interosseous muscles were well identified.

Traumatic factors, mainly the different types of fracture, prolonged external compression or severe strain of the brachial plexus and humeral artery, were also considered in the study but were not present in this case.

In reviewing the evolution of Volkmann's contracture I observed references in the literature to spontaneous recovery. As is known, some structural changes are reversible, in which circumstances excision of the infarct is done only in cases of severe involvement (Seddon, 1956).

When conservative treatment is used, the only criteria are supplied by pathologic examination.

According to Seddon (1956), recovery occurs in two phases:

1. In the forearm muscles there is a fairly quick recovery, earlier in the extensors than in the flexors, proceeding at about the same rate in all muscles. In the hand, recovery takes much longer. After a typical degeneration of nerve fibers the rate of regeneration after three months is less than 1 mm. a day for sensory fibers and rather less for motor fibers in the proximal-to-distal progression.

This kind of reversible damage was demonstrated experimentally in the rabbit by Clark and Blomfield (1946). Under favorable conditions the dead muscle fibers are removed and shortly replaced by new ones, which grow longitudinally along the surviving sarcolemmal tubes from the unaffected muscle above and below.

2. Partially reversible damage of the muscles may show partial recovery, but a permanent contracture may develop.

Histologically, both types of damage reveal diffuse fibrosis. Griffiths (1950) maintained that regeneration may occur years later, considering that complete and continuous function is an important stimulus.

In the case of my patient the initial recovery was observed in the extensor carpus longus, the extensor carpus brevis and the extensor digitorum subliminis. Shortly thereafter, the patient gained some degree of dorsiflexion of the wrist. The abductor pollicis longus and the flexors are progressively recovering (Fig. 1*B*).

The thenar, hypothenar and interossei have not yet regained function, but their partial recovery is expected soon.

Many surgical methods have been devised to combat the etiologic factors and to correct the vicious position in such a way as to restore power to the paralyzed muscles. Various operative procedures, including certain tendon and muscle transplantations, have been designed to accomplish the two purposes at once.

The first requirement is to secure relaxation of the flexors of the wrist when they are retracted and then to lessen hypertrophy of the long extensors, a factor that plays an important part in the claw deformity of the fingers (D'Aubigné, 1955).

Eight principal methods are used:

1. Ombredanne's method, with external pin fixation.

2. Steindler's technic, with separation of the flexors of the wrist from their points of origin and reimplantation lower, on the freshened interval aspect of the ulna.

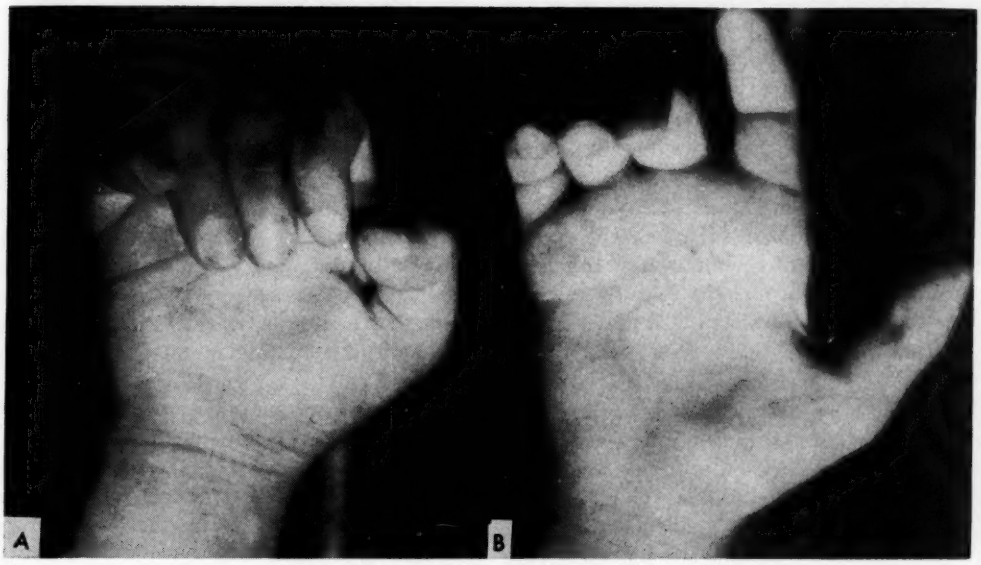

Fig. 1—*A*, before treatment. *B*, after second operation.

3. Sorrel's method.

4. The Fontaine, Müller and Montorsi procedure, with a diaphysis resection of the radius and ulna.

5. Transplantation of the flexor digitorum subliminis into the tendinous remains of deep flexors (in cases of mild involvement).

6. The muscle slide operation proposed by Page.

7. Scaglietti's procedure or the Scaglietti-Gosset operation.

8. Arthrodesis of the wrist (in cases of severe involvement with loss of control of the joint).

Phalen and Miller (1947), treating paralysis of the long flexors, have transplanted the extensor carpus radialis longus into the tendons of the flexor profundus, and it seems that this type of transplant might be eminently suitable in many instances of established Volkmann contracture.

According to Griffiths (1951), a rather formidable problem is to decide accurately, at the time of operation, which muscle tissue is hopeless and which will survive. Griffiths stated also that some of Parkes' premises are questionable and that the operation acts more as a tenodesis than as a working tendon transplant, but that is of little moment compared with the fact that it certainly appears to improve both function and appearance.

In 1951 Parkes pointed out that in most of the methods currently advocated the deformity is corrected by increasing the absolute or relative length of the contracted muscles, little attention being given to the problem of restoring adequate voluntary power to the long flexors tendons available for transplantation, but this eliminates the trick movement and none of the muscles made available has a range of movement to restore full function to the fingers.

My patient was operated on in two stages. At the first operation, with a plexus block and a bloodless field, a longitudinal incision was made in the midline of the forearm, starting at the end of the elbow and extending to 12 cm. above the wrist.

The median and ulnar nerves were exposed and dissected free a little upward, from the end of the elbow to the inferior third of the forearm. No macroscopic nerve lesions were observed except severe neighboring fibrosis. The ulnar nerve was then rerouted. The superficial muscles were examined, and the necrotic portions of the carpus flexor ulnaris were excised entirely. Some of the muscles of the flexor group were pale, heavily fibrotic, blue at the ends and yellow in the middle, but all matted together.

The palmaris longus and the palmaris brevis tendons were dissected free and cut off from the muscular portion; the brachial aponeurosis was excised completely. The deep muscles were brought into view after the aponeurectomy had been carried out; the flexor pollicis longus and the deep flexors of the fingers were largely ischemic and were only partially excised.

Some degree of correction was obtained after the other flexors had been stripped in the midportion of the forearm.

As there was no real voluntary power in the finger flexors, the joints were mobile and there was so severe a contracture of the long flexor muscles that I decided to transplant the tendon of the extensor carpus radialis longus into distal stumps of the profundus flexor, after dividing the flexor carpus ulnaris and the palmaris longus in order to allow dorsiflexion of the wrist. Postoperatively the patient was rehabilitated for two months while I waited for the extensors to regain their strength before using them to activate the fingers. As both the median and ulnar nerves had suffered severe compression by extensive and hard fibrosis and were damaged by ischemia, I considered the possible necessity of a nerve pedicle graft obtained from the medial cutaneous nerve of the forearm and the motor division of the median itself. Before I had decided to do the graft, however, the patient again showed flexion contracture of the digits, and the improvement gained by rehabilitation was lost.

After two months I performed the second operation, as follows:

General anesthesia was employed. The linear attachment of the flexor digitorum subliminis was partially stripped, and as the flexors of the wrist had been entirely dissected free and stripped a fair correction was obtained. We carried out the Scaglietti technic with an immediate extension of the wrist and of the last four fingers.

In the third month after the operation there was a strong tendency to recurrent contracture, but with careful supervision by the occupational therapist, with his methods of intensive reeducation and dynamic splintage, this tendency will eventually disappear. The advantages claimed for the Scaglietti surgical technic over those advocated seems to me, in the case I am reporting, the best treatment I could select for my patient.

Serial stretch splints will be maintained for many months, with constant care and supervision to prevent breakdown of the skin.

At the time of writing the patient has 80 degrees of elbow movement; the wrist is held in 20 degrees of palmar flexion, and 10 degrees can be obtained passively. He can now grasp some subjects, dress himself more easily, grip large objects and carry weights that are not too heavy. He feels that the right hand is now really becoming useful. It seems that the treatment of choice depends upon the duration and severity of the lesions, initially or later. It is advisable, however, to excise all tissue irreparably damaged by ischemia and to transplant or lengthen the shortened tendons even in the active muscles. Such reconstructive procedures, when indicated and well selected and performed, usually give highly satisfactory results.

CONCLUSION

Analysis of the symptoms in the case presented showed that the characteristic deformity of ischemia contracture of the forearm and hand is due to the contracture and paralysis of the flexor muscles of the wrist, the fingers and the intrinsic musculature of the hand (Fig. 1). Correction of the vicious positions caused by muscle retraction was well accomplished by nerve dissection and the Scaglietti operation.

The power of the intrinsic muscles of the hand is increasing well, and the patient now can work and swim with only mild discomfort. The final result, after only eight months, in such a desperate case seems a worthwhile accomplishment and means a great deal to the patient in his military career.

Some main facts should be emphasized:

1. The role of chlorpromazine as an etiologic factor in severe ischemic contracture.

2. The slide operation performed by the Scaglietti technic as a second stage procedure. This was the only possible surgical correction of the deformity.

3. The use of elastic splints. This must be maintained for many months more before complete recovery is obtained.

Author's Note: It is a pleasure to acknowledge the cooperation of Dr. Milton Yacavoni, who assisted in two surgical stages, and the helpful coordination of Brig. Francisco Milanez and Dr. R. Taliberti during the successive stages of rehabilitation.

CONCLUSIONI

Lo studio dei sintomi, in alcuni casi presentati, permette di concludere che la deformazione caratteristica della contrattura ischemica dell'avambraccio e della mano è dovuta a contrattura e paralisi dei muscoli flessori del polso, delle dita e della muscolatura intrinseca della mano (Fig. 1). La correzione di questo atteggiamento viziato si è ottenuta con la dissezione dei nervi e l'operazione di Scaglietti.

La forza dei muscoli intrinseci della mano aumenta considerevolmente e i malati ora possono lavorare con un minimo di impaccio. Il resultato definitivo, a distanza di otto mesi, dimostra come questa cura sia molto efficace in casi disperati e importante ai fini della carriera.

Alcuni punti meritano di essere considerati:

1. Il ruolo della cloropromazina come fattore etiologico nella contrattura ischemica grave.

2. L'intervento di Scaglietti, usato come secondo tempo, che rappresenta l'unico modo chirurgico di correggere la deformità.

3. L'uso di stecche elastiche che debbono essere mantenute per molti mesi prima che si sia ottenuta la guarigione completa.

CONCLUSIONES

El estudio de los síntomas que caracterizan la deformidad en la contractura isquémica del antebrazo y de la mano demuestra que es debida a contractura y parálisis de los músculos flexores de la muñeca y de los dedos de la mano (Fig. 1). La corrección de las posiciones viciosas causadas por la retracción muscular se consigue bien con la disección nerviosa y con la operación de Scaglietti.

La potencia de los músculos intrínsecos se aumenta bien y así el lesionado puede trabajar y mover su mano con bastante comodidad. El resultado final después de 8 meses en un caso desesperado parece verdaderamente haya valido la pena y la permitido al paciente continuar en su carrera militar. Debe llamarse la atención sobre algunos hechos:

1. El papel de la Clorpromazina como actor etiológico en la contractura isquémica grave.

2. La operación de deslizamientos de Scaglietti debe aplicarse en un segundo tiempo.

3. El uso de las férulas elásticas. Deben

mantenerse aplicadas durante muchos meses antes de obtener la curación completa.

CONCLUSIONS

L'auteur décrit un cas de contracture ischémique de l'avant-bras et de la main. L'analyse des symptômes a montré que la déformation caractéristique est due à la paralysie des muscles fléchisseurs du poignet, des doigts et de la musculature intrinsèque de la main (Fig. 1). La correction des positions vicieuses causées par les rétractions musculaires a été faite avec succès par une dissection nerveuse et l'operation de Scaglietti.

La force des muscles intrinsèques de la main se récupère de façon satisfaisante, et le malade peut à nouveau travailler et nager, n'étant que peu incommodé. Le résultat final, après huit mois seulement et dans un cas qui paraissait désespéré, semble être une réussite estimable; il est très important pour la carrière militaire du malade.

Quelques faits méritent d'être mis en évidence:

1. Le rôle de la chlorpromazine comme facteur étiologique dans les cas de contracture ischémique grave.
2. La valeur de l'opération de Scaglietti en tant que deuxième temps opératoire, qui était dans ce cas la seule méthode possible.
3. L'utilisation d'éclisses élastiques qui doivent être maintenues en place durant plusieurs mois avant que la guérison totale soit obtenue.

CONCLUSOES

A análise dos sintomas no caso apresentado demonstram que a deformidade caracteristica da contratura isquêmica do antebraço e da mão é devida a contratura e paralisia dos músculos flexores do punho, dedos e da musculatura intrinseca da mão (Fig. 1). A correção imediata das posições viciosas causadas pela retração muscular foram obtidas pela neurolise mediano-cubital e pela operação de Scaglietti. A força muscular intrinseca de mão está aumentando gradativamente bem e o paciente pode agora trabalhar e nadar com pequeno disconforto e dificuldades. O resultado final imediato, após somente oito meses, n'um caso tão grave parece significar uma grande melh ora funcional o que representa uma grande possibilidade em sua carreira militar.

Alguns fatos principais devem ser salientados:

1. O papel da Clorpromazina como fator etiologico de tão grave contratura isquêmica.
2. A operação de deslisamento feita pela técnica Scaglietti como segundo estagio cirurgico foi o único método possivel de atenuar a deformidade.
3. O uso de tração elastica deve ser mantido por muitos meses mais antes que se possa contar com uma recuperação funcional maior.

SCHLUSSFOLGERUNGEN

Die Untersuchung der Krankheitserscheinungen in dem hier dargestellten Falle ergab, dass die charakteristische Entstellung der ischämischen Kontraktur des Unterarms und der Hand durch die Kontraktur und Lähmung der Beugemuskeln des Handgelenks, der Finger und der inneren Handmuskeln zustande kommt (Abb. 1). Eine Verbesserung der durch Muskelverkürzung verursachten schlechten Stellungen liess sich gut durch Nervendurchschneidung und durch die Scaglietti-sche Operation erzielen.

Die Kraft der inneren Handmuskeln nimmt gut zu, und der Patient kann jetzt mit nur geringen Beschwerden arbeiten und schwimmen. Das nach nur acht Monaten erzielte Resultat scheint in einem so verzweifelten Falle ein lohnendes Ergebnis zu sein und ist für den Patienten in seiner militärischen Laufbahn von grosser Bedeutung.

Einige wesentliche Punkte sollen hervorgehoben werden:

1. Die Rolle des Chlorpromazins als ursächlicher Faktor bei schwerer ischämischer Kontraktur.

2. Die mit der Scagliettischen Technik ausgeführte Gleitoperation als zweites Stadium des Eingriffs. Dies war die einzige Möglichkeit, die Entstellung chirurgisch zu verbessern.

3. Die Verwendung elastischer Schienen. Dies muss viele Monate lang durchgeführt werden, bevor es zu einer völligen Wiederherstellung kommt.

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Make a thorough inspection. Never forget to look at the back of a patient. Always look at the feet. Looking at a woman's legs has often saved her life.

Failure to examine the throat is a glaring sin of omission, especially in children. One finger in the throat and one in the rectum makes a good diagnostician.

When listening to heart murmurs you must tune up your auditory hair cells and flatten out your Pacinian corpuscles.

The chief function of the consultant is to make a rectal examination that you have omitted.

—*Osler*

Editorials

History of Gynecology from Prehistoric to Modern Times

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He who cannot render an account to himself of at least three thousand years of time, will always grope in the darkness of inexperience, and merely live from day to day.—Goethe.

THE gynecologist, seeking the dawn of his art and science, finds that to glean the scattered facts of gynecologic history he must contend with the background of the main currents of medical thought.

Contributions to the development of gynecology were made by general practitioners, physician-anatomists, philosophers and, later on, physiologists, pathologists, bacteriologists, chemists, surgeons and physicists.

Practice in prehistoric times can only be conjectured. Information is meager and limited to a few statues and bas reliefs.

Primitive man was aware of the phenomenon of menstruation, reproduction and its complications; of these there are no records.

The earliest cultures of which we have written records arose simultaneously in the great river valleys of Egypt and Mesopotamia about 5000 B.C. Herodotus tells us that the early Babylonians had no physicians, and that the sick were brought to the market place and prescribed for by any passing person. This is a practice that still exists today, when neighbors and relatives make diagnoses and suggest treatment. Gynecology received scant consideration and did not grow, for demons were considered to be the cause of disease and were dealt with by incantations and magic. Since evil spirits were considered the cause of disease, they were either driven or coaxed out of the body by rituals with such obnoxious substances as human or animal dung.

Our source of knowledge of ancient gynecology is derived from Egyptian documents known as papyri. The oldest is the Kahun papyrus, which dates back to about 2000 B.C. and is limited to gynecology and veterinary medicine. Diagnosis was made on the basis of the patient's symptoms and external observation of the breasts, abdomen and external genitalia. Prolapse of the uterus, being outside the body cavity, was commonly observed; many general and local symptoms were attributed to this condition. Incantations were not employed, but various concoctions of incense, dates, oil, organs and the excreta of animals were smeared on the breasts, abdomen and external genitalia. Thus, crocodile dung, mixed with a pastelike vehicle, was made into a suppository to be inserted into the vagina. These varied mixtures were used for sterility, to produce abor-

tion and to combat infection and hemorrhage. Surgical procedures were not mentioned.

From the Ebers papyrus (which dates back to about 1550 B.C.) came another long list of prescriptions. To replace the prolapsed uterus, a base of honey and petroleum was smeared on the finger of the patient, and the uterus was then pressed upon for replacement. If these measures failed, fumes of wax and hot charcoal were recommended (see Fig. 1).

Palm fruit and cypress, blended with oils, were used to treat inflammation of the vulva and uterus. Peppermint water, probably in the form of douches, was prescribed to cool the vulva and the uterus. Tampons of jaspis honey and collyrium were allowed to remain for four days in the vagina to overcome a watery discharge, associated with pruritus. To prevent leukorrhea the dried liver of a swallow was rubbed with sour milk and then placed on the breast, belly and joints. Thus, there were extant many prescriptions for female ailments; to regulate the menses, a douche of a mixture of garlic and wine or a fennel, wonder-fruit, honey and sweet beer. To insure abortion during the first, second and third months, dates, onions and fruit of the acanthus were crushed in a vessel containing honey, sprinkled on a cloth, and applied to the vulva.

Egyptian knowledge of gynecologic disease was extremely vague. Superficial examinations of the external genitalia, vagina and cervix were undertaken, but Egyptians knew nothing of the anatomy of the intrapelvic genitalia, the ovaries and the tubes. Infections were common, since prostitution existed. Childbirth injuries and their complications occurred, but there were no references to gynecologic surgery. Therapy was limited to local applications and to the use of tampons, fumigations and vaginal injections or douches.

During the forthcoming month of 1959 and as long thereafter as possible, the editorial pages of the Journal of the International College of Surgeons *will be honored by presentations of rare and extraordinary historic value, the lectures presented at the International Surgeons' Hall of Fame on medical and surgical history from the earliest recorded achievements to those of our own times. We believe that* Journal *readers who were not able to attend the lectures will find them as exciting as did the audiences present at their delivery. The story of progress in the healing arts and the giants of medicine and surgery to whom we owe the amazing brilliance and scope of modern achievements is intrinsically thrilling and is a vital part of the education of every cultivated man and woman, inside or outside the profession. It is altogether fitting that it should appear in these pages, since the International College of Surgeons is first, last and always a teaching institution.*

Temples served as gathering sites for the sick. Priest-physicians and physicians under the patronage of officials of the temple combined prayer with a multitude of prescriptions. As long as these practitioners followed the sacred or Hermetic books of Thoth, the god of wisdom, no blame was incurred, even though the patient died. Although Egyptians had for generations embalmed their dead, they possessed only the most rudimentary ideas of anatomy and physiology; they recognized that the uterus was the seat of

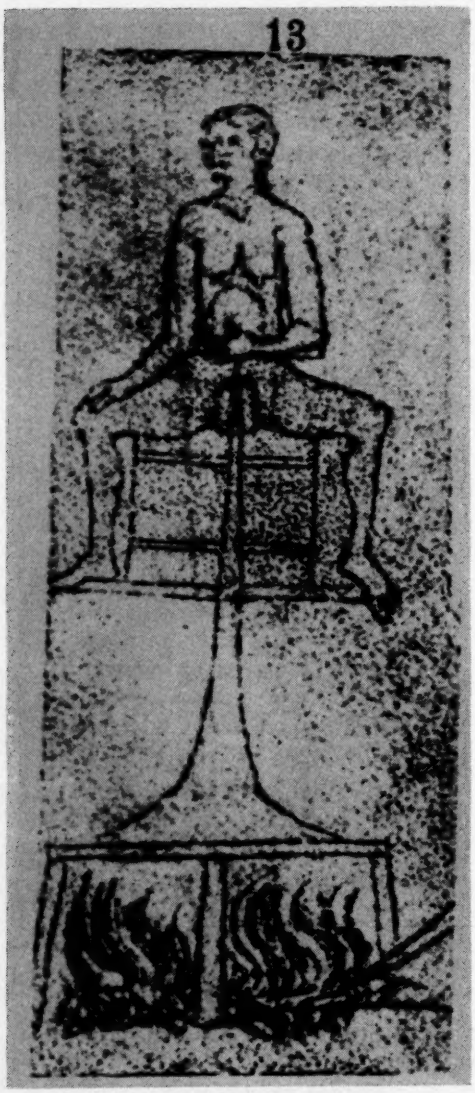

Fig. 1.—Fumigating apparatus.

pregnancy. They called the uterus "Mother of Men," but they had no conception of the ovaries or tubes. From the gynecologic view, there were extant only recipes to prevent pregnancy, to cause abortion and to prevent the womb from wandering throughout the body. At best, Egyptian medicine never achieved the scientific attitude adopted by the Greeks.

The ancient Jewish conception of disease adhered closely to that held by Babylonians, Assyrians, and Egyptians. The Jews believed that illness and epidemics were expressions of the wrath of God. Accordingly, Jews sought relief in prayer, sacrifice and an exemplary life. They left behind no medical treatises or documents. Biblical literature, however, contains some reference to medicine in general, with a few comments of a gynecologic nature. Symptoms were recognized as a manifestation of inward changes. Their sanitary and hygienic laws were striking. The regulation of the sex life of a woman, particularly in respect to menstruation and parturition, may have been a factor in the low incidence of carcinoma of the cervix among Jewish women. It is also thought that circumcision, in preventing the accumulation of smegma, may have been an additional preventive.

Contraception, though prohibited, was practiced by ancient Jews. The sin of Onan suggests the common present-day practice of "withdrawal." Sterility was looked upon with reproach, and an effort was made to combat it by dieting, hygienic living, drugs and regulated coitus. A few Talmudic references are preserved in the Niddah, a section devoted to menstruation. Virginity was demanded of a bride; lack of staining on initial coitus often led to divorce and stoning. One test for virginity went like this: If a woman sat on a barrel of wine and one was able to smell the beverage on her breath, she had been deflowered; odor, on the other hand, was absent in a virgin.

In one of the sacred books (Charaka ayurveda) of the Hindus, a chapter was devoted to diseases of the female generative organs. While dissection of human bodies was not prohibited, it was not very pleasant. A body was placed in a stream

for some days, or until it became putrid; the skin was brushed off and different parts were examined. Hindus have described the anatomy of the uterus and the tubes. They spoke of barrenness due to injury of the tubes. A long list of instruments has been described, including forceps, pincers, tube-like catheters, bougies and the rectal speculum. The actual cautery, enemas, suppositories and pessaries are also mentioned.

Twenty-four diseases of women were given descriptive terms. Treatment of these diseases varied according to the "humor" diseased. Thus, when air was considered diseased, warm fomentations or poultices were applied and steam baths prescribed. A piece of cloth soaked in oil was to be kept in the vagina. If an odor arose, a decoction of astringent barks was introduced. For menorrhagia, applications of cold or astringent medicines were advised, venery avoided, and a diet of cool simple foods required. Stone in the bladder required a suprapubic operation performed by the husband, since it was considered dangerous and he was held blameless. Atrocar was used for ascites. Bladders of pigs or buffalos were employed for injecting fluids into the bowel, vagina and bladder. Injection pipes consisted of gold, silver, copper, iron, hard wood and ivory.

Theoretically, Greek medicine was derived either from India and Egypt or came on as offspring of the Grecian mind. The oldest documents are found under the general title "The Works of Hippocrates" (430 B.C.). Earlier works may have been destroyed along with the Alexandrian library by the Caliph Omar (642 A.D.). Four books of this collection are devoted to the diseases of women. Ancient Greeks were acquainted with the shape of the uterus. They thought it acted in such a way as to suck and draw juices from various parts of the body. The drinking of unwholesome water caused dropsy of the uterus, and as they possibly observed a hydatid mole, it was interpreted as dropsy. Pessaries and suppositories were used in the treatment of puerperal fever and septic abortion, often with a fatal outcome. To stop menses, cupping was applied to the breasts.

In the Hippocratic Oath, this sentence occurs: "I will not give to any woman a pessary to produce abortion." Although Hippocrates traveled widely, had a broad knowledge of the medicine of his time and was a keen observer, he contributed little to gynecology.

Progress was evident when the Greeks described the vaginal examination, which was performed after fumigation and a bath. The midwife or the practitioner introduced her finger, straightening and correcting the orifice of the uterus. Neither bimanual nor rectal examination is described. For prolapse of the uterus there was succussion, with the patient on a ladder-like framework in the inverted position. Hematometra and pyometra are accurately described.

The Greeks also used fomentations (cataplasm of honey and linseed meal), pessaries, tampons, fumigations, sounds and catheters. A mechanical pessary consisted of a pomegranate split into two halves.

Hippocrates died in 357 B.C. About this time Greece began to decline in prosperity. In the 2300 years that have passed, no one has ever successfully challenged the Hippocratic teaching that (1) there is no authority except fact; (2) facts are obtained only by accurate observation, and (3) deductions are to be made only from facts.

The Alexandrian school of medicine bridged the gap from the decline of Greece to the maturity of Rome, when Roman medicine began to develop (about 200 B.C.) under the tutelage of Greek physi-

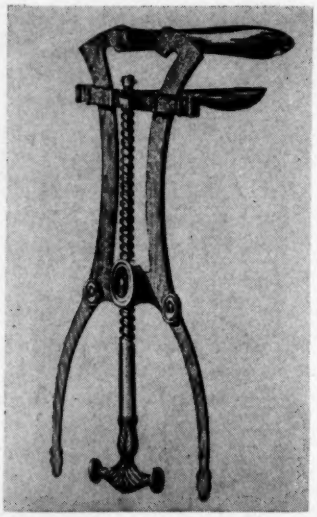

Fig. 2.—Three-bladed speculum (circa 60 A.D.).

cians. After the victories of Pompey, Caesar and Augustus, Rome settled down to a period of peace, luxury and vice. Pelvic inflammation became common, owing to venereal diseases. Prostitutes were compelled by law to dye their hair yellow or blue.

The encyclopedists in the early years of the Christian era collected and recorded all that was known in literature and science. Celsus (53 B.C. to 7 A.D.) wrote a work called "De Medicina," in which are a few chapters and references to gynecology. Many of the remedies used by the Greeks for diseases of the generative tract are described therein. Celsus differentiated between congenital and acquired vaginal atresias and emphasized the importance of a transverse incision in order to avoid injury to the urethra.

Pliny (23 A.D. to 79 A.D.) wrote an extensive work entitled "Materia Medica." He described the practice of persons who had recovered from a disease, outlining in the temples of that god the remedies to which they owed their restoration to health, so that others might derive benefit therefrom under similar circumstances. Tablets were suspended on walls, and accompanying them were frequently suspended casts of the part, moulded in terra cotta, or small models of gold or silver. Uteri were gifts to the gods, for the purpose of insuring an easy labor, or as a thanksgiving following safe delivery, or after recovery from difficult labor or disease. Small cakes in the form of the male and female organs of generation were sold by the baker girls for sacrifice to Venus and Priapus.

Rufus Ephesius described calculi in the female bladder, while Pliny was the first to describe the fallopian tubes.

Soranus (98-138 A.D.) was an outstanding specialist in gynecology, superior to his predecessors because of his methodical study of various subjects and because of his original and judicious thinking. In describing a disease, he gave a historical introduction encompassing the views of his predecessors, the causes of the trouble and the prominent symptoms. His work is justly considered one of the three most important gynecologic treatises written prior to the present century, the other two being the Pseudo-Hippocratic Treatise and the work of Aetius.

In his opening chapter, Soranus deals with the special qualities that a midwife should possess and, among other points, lays down the rule that her nails should be trimmed and rounded so that they will not wound the organs. He wisely remarks that the midwife should be discreet, since she is often trusted with family secrets.

Although he was aware of the structure of the female genital organs and gave a fairly accurate description, he considered anatomic knowledge of little importance. He knew that the uterus was not essential to life, for he says that not only does it fall down, but in some women it may be cut away without causing death, and that Galatia pigs fatten after the uterus is removed.

Soranus discussed inspection, palpation and percussion, and differentiated a fibromyoma from dropsy by means of physical examination.

Since women were accustomed to examine themselves, the following contraceptive advice was given: to prevent conception, women before coitus should smear the cervix with rancid oil, with honey, or with a decoction of cedar oil; or she should push into the os a thin strip of lint; or introduce into the vagina an astringent pessary.

Therapeutic agents and instruments used in examinations and during operations were many in number. Soranus' description of acute metritis was excellent and accurate. His extensive writings included those of many other writers; thus, in considering treatment of prolapse of the uterus, he did not approve of the treatment adopted by Euryphan, who suspended the patient head downwards on a ladder for a day and a night, keeping her recumbent after this and giving her cold ptisan tea. The reasons for his disapproval were that suspension was intolerable to the patient, while drinking tea caused flatulence. He also objected to Evenor's method of placing beef in the vagina, because putrefaction would bring on ulceration. Diocles replaced the womb by forcing air into it via a blacksmith's bellows. He then introduced into the vagina a pomegranate that had been peeled and soaked in vinegar. Irritation of the parts by a bag of hair to cause contraction was described, as well as fumigation. The treatment advised by Soranus was as follows: the bowels and bladder were to be emptied by an enema and catheter respectively, since retention of feces and urine was common in those cases, because the displaced organ pressed on these parts and so narrowed the outlets. After this preliminary treatment the patient was placed on her back, the pelvis elevated, the thighs flexed and separated. The prolapsed parts were then well smeared with hot oil, and a plug of wool the size of the vaginal canal was made ready by tying a piece of thread around it, after which it was dipped in some medical substance, such as posca or a warm decoction of myrtle or mastich; then the whole of the prolapsed parts, by gentle pressure, were borne upward until the uterus regained its normal position, and the whole of the plug was introduced into the vagina. A pad of wool soaked in astringent wine was applied to the vulva, the abdomen was covered with sponges or wool soaked in vinegar, while bandages encircled the hypogastrium, pubes and loins, the thighs being crossed one over the other. On the third day, the plug of wool being still retained in the vagina, the patient was given a sitz-bath of warm, dark, astringent wine, after which she was again placed on her back, the buttocks raised, and the plug was carefully removed from the vagina and replaced by another; a cataplasm was then placed on the hypogastric region. Three days later the bath was resumed and the plug removed. The treatment was continued until the patient was improved.

If the uterus remained prolapsed and was very inflamed and painful, it was considered better to irrigate it or to apply linseed meal poultices; then, after this preliminary treatment, to proceed as directed above. In obstinate cases local applications were to be employed constantly, and the general health attended to. If parts of the uterus or the whole of it became black, the womb having remained prolapsed for a considerable time, it was deemed advisable that it be resected partially or entirely. This procedure was possible, he said, because the lobe of a liver or of a lung which was gangrenous, after prolapse of these organs, had been resected.

Soranus followed the methodical thinking of Hippocrates and added his own careful observations and deductions.

In looking back over the progress of medical science and reviewing the growth of the specialties, including gynecology, among the Roman people at the end of the first century A.D., it is clear that it was in essence transplanted Greek medicine, whose influence was felt for the next six centuries. Although specialization had been common in Egypt for centuries, it now developed afresh, because Roman doctors found that they were unable or perhaps unwilling to acquire a comprehensive grasp of every branch of medicine. While gynecology was practiced by physicians, midwives also attended the simple diseases peculiar to women.

From the surgeons of the Alexandrian schools came the first real impulse to engage in operative surgery. They had every opportunity to study anatomy and to familiarize themselves with the positions of the organs of the body as a result of their interest in vivisection. When the ligature was introduced for the purpose of controlling hemorrhage due to severed vessels, the first real advance in surgery was made. Celsus was one of the first writers to allude to the ligature, but he did not mention its composition. Later, Heliodorus and Galen described torsion of the small vessels, after having seized them with a hook. The acme of the ligature's fame was reached when Antyllus (350 A.D.) employed it in his well-known operation for aneurysm.

Various surgical procedures were now carried out, similar progress taking place in gynecology. Specialists operated on the female genital organs, removed small growths from the cervix, sometimes attempted hysterectomy, and performed plastic operations in cases of atresia and other conditions. The vaginal speculum was in use before the year 79 A.D., at which time Herculaneum and Pompeii were destroyed; it was in the ruins of these cities that a three-bladed speculum was discovered early in this century (Fig. 2).

In obstetric cases, when the need arose, the child was removed by embryotomy; cesarean section was occasionally practiced. Many instruments then in use included needles and forceps of various shapes and kinds, catheters, cupping instruments, sharp and blunt hooks, cauteries, knives, lancets, bistouries and rectal and vaginal speculums (Fig. 3).

Claudius Galenus, one of the greatest of the ancient contributors to medicine, was born in Pergamus, in Mysia (130 A.D.). Although he wrote at least four hundred distinct treatises dealing with every branch of medicine, he had no systematic treatise on gynecology. His scattered remarks concerning the diseases of women were found so lacking in detail that they were of no value. He was the first, however, to point out clearly that the fallopian tubes were pervious and that they conveyed the ova to the uterus. These points were entirely missed by Soranus and other ancient writers.

After Galen's death (200 A.D.) an abrupt decline occurred, so that the works of the next thousand years are but shadows of those written by Galen and his predecessors.

With the fall of the Roman state the further progress of medicine was recorded in Byzantium, where science and learning were destined to lead a sickly existence for a thousand years. Constantine made Byzantium the capital of the empire (328 A.D.) after capturing Rome in 312 A.D. and defeating his rival Licinus in 323 A.D. Thus it was that medicine returned to its source, Greece.

Another influence on medical progress now developed. Christianity gradually grew in importance so that the rich and the powerful were converted to its tenets;

even Constantine, the autocrat of the empire, became a Christian. As the church believed in the preternatural, it was antagonistic to medicine in all its branches. It replaced medicine by a system of faith-healing, in which miracles, prayers, charms and amulets played a dominant role. Anatomy suffered most, since dissection was not permitted, either of animals or of human bodies. The redeeming feature of the Christian influence was the establishment of hospitals, which were supported by contributions from charitable people.

Fabiola founded the first Christian infirmary at Rome, at the close of the fourth century; St. Basil established a large charity at Caesarea, while at Edessa, Bishop Rabboula built a hospital for the exclusive use of women.

Aetius, who lived during the middle of the sixth century and was chief officer in attendance on the Emperor, probably Justinian I (527 to 565 A.D.), was the first writer to mention such Eastern drugs as cloves and camphor; he was also the first important Christian Greek medical author to leave us examples of the spells and charms in use in his day.

As to the various positions of the patient for examination or treatment, the lithotomy position is described, as well as the knee-elbow and the lateral position.

Various therapeutic agents alluded to by Aetius had already been described by other authors and therefore need not be repeated. The mechanical pessary had not yet been mentioned. Aetius, however, was the first to mention the use of sponge tents for the purpose of dilating the cervix.

Carcinoma of the uterus is described clinically, but no operative procedures are mentioned. Remedies were given to alleviate pain and stop hemorrhage.

Inflammation of the uterus is discussed in detail by Philumenus. In addition to rest, massage, fomentations to the feet and hands, bleeding, pessaries and vaginal injections were practiced.

Aetius presented Aspasia's views in describing displacement of the uterus. Although he advanced some highly imaginative ideas as factors producing lateroversion, such as the liver on the right and the spleen on the left, the results of displacement are well described. Prolapse of the uterus is discussed, and his views on hysterectomy are interesting. He reported that when the whole uterus was putrid, it was sometimes removed, the women nevertheless continuing to live.

Fibromyoma of the uterus was called a mole because sufferers from the affection moved slowly and with difficulty. Polyps of the uterus are described under the heading "decauda," because the fleshy body springs from the mouth of the womb, filling the woman's vagina and even projecting beyond the vulva like a tail.

Despite the fact that Aetius was primarily a compiler, his writings gave an insight into the works of the men of his time as well as those of predecessors, the originals of which have not yet been found.

Paulus Aegineta, of whose life little is known, lived in the sixth century A.D. His writings are compilations of a learned physician, a skillful surgeon and a man well versed in gynecology. He drew his materials from all available sources, particularly from Galen, Oribasius, Aetius and Alexander Trallianus, and seldom acknowledged the authorities from whom he derived his information. Paulus appears to be the first professional male midwife. He described three different kinds of pessaries, the emollient, the astringent and the anastomotive. They were applied to the womb. The emollient was prepared from Tuscan wax, the oil of privet and of lilies, the fat of geese and of fowls, unsalted butter, burnt resin, stags' marrow

and fenugreek, and were used in inflammations and ulcerations of the womb.

Paulus gave an extensive exposition on the closure of abdominal wounds, as to the method employed, suture material used and aftercare.

With the death of Paulus Aegineta, the last of the eminent Greek authors on medicine passed away. Although Constantinople was not conquered by the Turks until 1453, there was nevertheless no medical writer worthy of mention connected with this city after Paulus' death, except perhaps Actuarius, who served as court physician (1000 A.D.) but in whose works are few references to the diseases of women.

In 1646 A.D. Alexandria was captured by Amrou during the Caliphate of Omar II, who expelled the professors from their seats of learning, pillaged the city and burned the great library of 700,000 volumes. Some of the medical books must have been rescued, however, for it was from these remnants that the Arabians copied their knowledge. They contributed nothing new, for they had very limited experience in gynecology. Religious laws forbade a man to examine the genital organs of a woman; consequently, gynecology and obstetrics were left to women, who performed not only minor operations but embryotomy and lithotomy.

Many volumes were conveyed to Greece and Italy, and these were translated into Latin, thereby forming a valuable foundation for the revival of learning during the fifteenth century. Actually, the contributions to gynecology by the ancients ceased with the death of Paulus Aegineta. Medicine was buried during the Dark Ages, and it was not until about the fifteenth century that its resurrection occurred.

Neither gynecology nor obstetrics prospered in the hands of the Arabs, because they had a profound aversion for these specialties and held a mistaken sense of values and prudery. The bulk of Arabic gynecology came from Galen, Aetius, Oribasis and Paul. The work of the two specialties in fact was carried out by midwives. Albucasis (1013-1106), considered the greatest surgeon of the Mohammedan Renaissance, made it quite clear that, whenever possible, gynecologic operations were to be performed only by midwives or female attendants possessing a medical knowledge. Most women, he stated, are unwilling to expose themselves to a male physician and, moreover, the idea was also repugnant to their husbands. If, however, female attendants were not available, the help of a physician was permissible provided he was well mannered and had a working knowledge of the diseases of women. The cautery was used more often than the knife because bleeding was better controlled. The treatment of prolapse of the uterus was unique: Let the woman lie on her back, have someone sit on her chest; then terrify the patient by placing small lizards or frogs at her feet. As she tries to avoid them, she will withdraw her extremities. This action on her part was so intense that the prolapsed uterus was drawn into place. Averraes, the last of the great Arabic physicians, reported a strange case of noncoitional impregnation. "There was a certain neighbor of mine who stated on oath—and whom I have no reason to doubt—that she became pregnant while taking a bath in the same warm water in which bad men had previously had orgasms."

During the final stages of Arabic Medicine there developed an independent medical school at Salerno in southern Italy, whose physicians adhered to Greek concepts of medicine. Constantine, one of the leaders at Salerno, covered the entire field of clinical gynecology in twelve pages. He mentioned that hermaphrodites do not menstruate. It would be repetitious to describe their manner of gynecologic practice. From England, however, came an

initial inkling of organotherapy, when St. Hildegarde (1099-1179), the Abbess of Rupertsberg, suggested that sterile women be advised to eat the uturi of fully developed virgin cows and sheep. Trotula, a female physician, wrote a 36-page pamphlet on women's diseases which was a conglomeration of many conditions and very little gynecology. The word "flowers" to designate the menstrual period was used for the first time.

The thirteenth century contributed little to gynecology. The following century and a half witnessed the early establishment of hospitals, as well as the revival of human dissection at Bologna and Padua; then, later, pathology. The first human dissection in Europe for purely anatomic purposes was performed by Mandino at Bologna in 1315, after a lapse of fifteen hundred years when the last anatomic demonstrations on the human cadaver were conducted at the Alexandrian School of Medicine. Mandino corrected the errors which were repeated in the gynecologic literature from the days of Hippocrates on by showing that the normal nonpregnant uterus did not extend to the umbilicus, and that the uterus, being a partially fixed organ, did not wander to the region of the diaphragm in cases of "uterine suffocation." The gynecology of this period, the few aforementioned exceptions aside, remained unchanged and without innovations. At this time surgeons appeared somewhat more daring, and an isolated postmortem cesarean case, extirpation of a prolapsed uterus and an abdominal incision at the umbilical area for the removal of fetal bones in abdominal pregnancy were reported. The terms *perineum, cervix* and *procidentia* were also introduced.

G. Berengario da Carpi, a distinguished physician of the sixteenth century, relates how his father, also a physician, removed a prolapsed gangrenous uterus by means of a scalpel (rasario). His own technic for vaginal hysterectomy consisted in ligating the prolapsed organ with strong twine and tightening the suture until the organ was severed; the parts were then bathed with a solution of wine previously boiled with honey and aloes. The postoperative febrile reaction lasted two days.

Andreas Vesalius (1514-1564) revolutionized anatomy and accurately described the entire genital tract. He was the first to use the word "uterus" instead of "matrix" and the first to describe decidua and to use the word "pelvis," but he continued to call the ovaries "testicles." His distinguished pupils included Gabriels Fallopic (1523-1562), whose name is connected with the fallopian tubes, because he so clearly described them and because he was the first to call them *uteri tubae.* They had been previously mentioned by Rufus and Soranus and adequately described by Vesalius. Colombo, also a student of Vesalius, first used the term "labia" and considered it essential to protect the uterus from dust, cold and air. The word "vagina" was first used by him, and he was also the first to record a case of congenital absence of the vagina and uterus.

Ambrose Paré (1509-1590) contributed a monograph to the Israel Spach's Gynaecia, a massive volume of more than a thousand pages. Paré was the first to bisect and examine a fibroid uterus removed at autopsy; he also established the differential diagnosis of fibroids and pregnancy. He was highly ingenious in his gynecologic therapy and was the first to use oval pessaries of hammered brass and pessaries made of waxed cork for prolapsed uterus.

Jean Fernel of Omiens (1497-1558) was the first to use the term "gonorrhea" and to demonstrate a penile or vaginal discharge of venereal origin. He was a great observer and had full clinical knowledge of pelvic inflammatory disease.

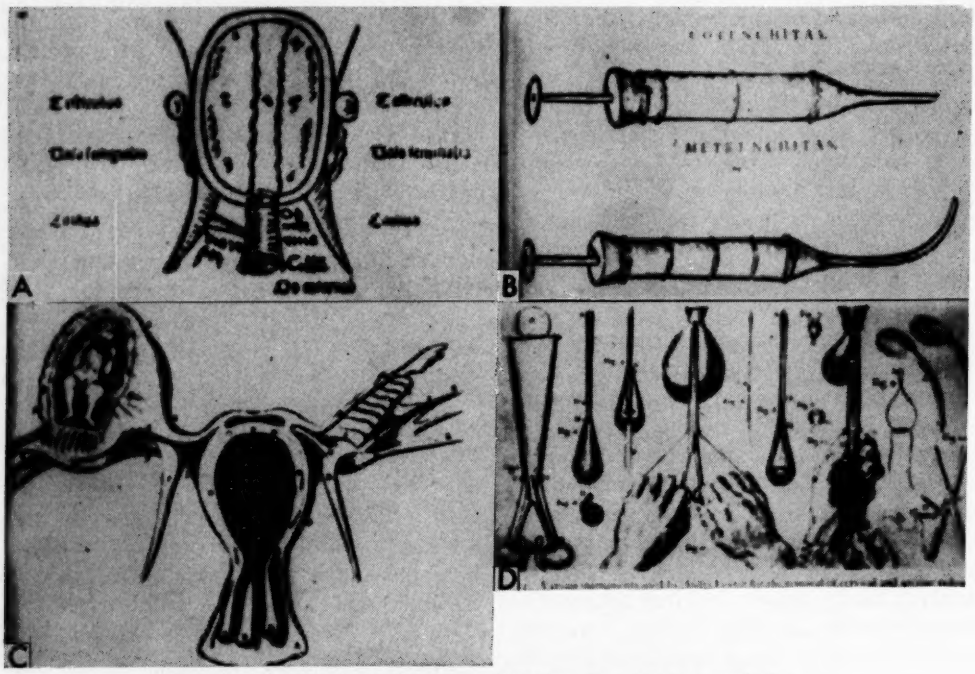

Fig. 3.—*A*, drawing of uterus (1501). *B*, syringes used for irrigation (1600). *C*, first recorded ectopic pregnancy (Regner de Graaf, 1679). *D*, instruments for removal of vaginal and uterine polps (1771). *E* (*below*), belt for ovarian cyst (1646).

G. Andrea Della Croce, a Venetian physician of the sixteenth century, used vaginal irrigation for uterine perforation and advised against surgery. He described the removal of a "scirrhus" of the uterus that became gangrenous and stated that the woman lived. The operation in this case is considered the first hysterectomy for carcinoma.

During this period of progressive anatomy, Regner de Graaf (1641-1673) presented an excellent description of the ovary, the corpus luteum and the lymphatic system of the uterus. Mauriceau, Cyprianus and others began reporting instances of ectopic pregnancy of various duration, observed at postmortem examination. Occasionally, the fetus was removed by enlarging an abdominal fistula that developed after its death. There were, however, too many tragic endings. Similar results followed surgical attempts to remove prolapsed uteri.

Another major contribution of the times was exposure of the mistaken notions dealing with hysteria and hysterical suffocation.

Rhazes and several other Arabian clinicians challenged these misconceptions, and it was Charles Lepois, Thomas Willis and Hendrik van Roonbuyze who established the fact that the symptoms of hysteria could occur in either male or female and that the attack began in the central nervous system.

The eighteenth century was characterized by the growth of rationalism and religious skepticism. There was emphasis on such fundamental subjects as pathology, embryology, histology and experimental physiology, and many independent clinical entities were discovered. Particular interest attaches to Jean Astruc (1684-1766), who published six volumes on gynecology and an important treatise on tumors. So much was happening during this period that it is difficult to narrow one's sights to a single specific field. Obstetrics was vastly improved, and medical men, rather than midwives, assumed the leading roles. Astruc was the first to refer to bimanual examination, stressing the value of the vaginal speculum. His was the best account of an initial attack of gonorrhea in the female, and he was first to mention an incubation period. His observations on pelvic infections are quite accurate, although his interpretation of their etiologic factors may not be acceptable. John Hunter and Benjamin also wrote on gonorrhea. Carcinoma of the cervix was recognized; it was called a condition of lymphatic origin and incurable.

Everard Home, brother-in-law of John Hunter, reported in 1799 that Hunter performed the first artificial inseminations in women.

William Hunter offered the first clear exposition on retrodisplacement of the uterus. Others added further details and treatment, much of it quite practical.

After the report of the first cystocele by Jean Metry (1645-1752), in the eighteenth century, there were many others, as well as dissertations and graduation theses. Metry also mentioned perineal and other vaginal hernias.

The first gynecologic operations performed on the American continent were for extrauterine (abdominal) pregnancy. John Bard (1716-1780), a New York surgeon, in a letter to John Fothergill of London, said that he had operated on a Mrs. Stagg, age twenty-eight, for the removal of an intra-abdominal fetus. The patient recovered. This letter was written on Dec. 25, 1759, and was read before the London Society of Physicians on March 24, 1760. As usual, others made attempts to duplicate the procedure, with and without success.

Up to this time ovarian cysts had been considered incurable. Now, tapping of the cysts began in earnest and was repeated almost *ad infinitum*, even up to one hundred fifty-five times. But no one ventured to remove the cysts, and they were observed only at autopsy. Soon after, there was emphasis on incision and drainage.

The first extirpation of normal ovaries when they were present in a hernial sac was performed in 1756 by Percival Pott, a famous surgeon of St. Bartholomew's Hospital.

The first operation recorded for the evacuation of a tubo-ovarian abscess was performed by L'Aumanier of Rouen in 1776. Henricus Callisen opened an adnexal pus sac *per vaginam*, and this was repeated by Macaru in 1788.

Vesicovaginal and rectovaginal fistula received considerable attention, mainly because they were so common, with only occasional treatment attempted. The use of indwelling catheters and the insertion of innumerable pessaries of gold, silver,

Fig. 4.—First oophorectomy, performed by Ephraim McDowell in 1809.

wax and wood to fill the vagina and close the aperture were ineffectual.

Thus, the eighteenth century closed on a note of progress. It has been said that an alumnus of the medical school of Cos, who learned his gynecology from Hippocrates, would have little difficulty in understanding the course of lectures on diseases of women delivered by Jean Astruc at the University of Paris, though more than two thousand years separated the lives of the two.

Early in the nineteenth century gynecology was still essentially medical in its scope and perspective, and the literature was chiefly concerned with clinical and speculative observations. The second half of the century, with the introduction of embryology, histology, cellular pathology, bacteriology, anesthesia, antiseptics and aseptic surgery, made such gigantic strides that more was accomplished in solving gynecologic problems during this period than during the preceding two thousand years.

In 1817, Christian Heinrich Ponder described the formation of the three primary layers of the blastoderm for the first time. He also described the metamorphosis by which these layers are transformed into the various organs and systems. Karl Ernst von Baer, in 1827, discovered the mammalian ovum and found the human ovum in a Graafian follicle. These discoveries led to additional investigations and finally to observations on the process of fertilization. The first textbook devoted to pathologic anatomy (nonmicroscopic) of the female sexual organs was written by Julius M. Klob, an English translation of which appeared in 1868. Rudolf Virchow (1821-1902) began publication of his *Handbuch* in 1854.

Away from the scientific laboratory, a clinician occasionally makes a contribution that initiates important trends. In the absence of anesthesia, without knowledge of antisepsis and without trained assistants, Ephraim McDowell, in December 1809, successfully performed the first oophorectomy. This dramatic episode warrants a reading of McDowell's comments:

"In December, 1809, I was called to see a Mrs. Crawford, who had for several months thought herself pregnant. She was affected with pains similar to labor pains, from which she could find no relief. So strong was the presumption of her being in the last stage of pregnancy that two physicians, who were consulted on her case, requested my aid in delivering her. The abdomen was considerably enlarged, and had the appearance of pregnancy, though the inclination of the tumor was to one side, admitting of an easy removal to the other. Upon examination *per vaginam* I found nothing in the uterus, which induced the conclusion that it must be an enlarged ovarium. Having never seen so large a substance extracted nor heard of an attempt or success attending any operation such as this required, I gave to the unhappy woman information of her dangerous situation. She appeared willing to undergo an experiment, which I promised to perform if she would come to Danville (the town where I live), a distance of sixty miles from her place of residence. This appeared almost impracticable by

any, even the most favorable conveyance, though she performed the journey in a few days on horseback. With the assistance of my nephew and colleague, James McDowell, M.D., I commenced the operation, which was concluded as follows: Having placed her on a table of the ordinary height, on her back, and removed all her dressing which might in any way impede the operation, I made an incision about three inches from the musculus rectus abdominis on the left side, continuing the same nine inches in length, parallel with the fibres of the above-named muscle, extending into the cavity of the abdomen, the parietes of which were a good deal contused, which we ascribed to the resting of the tumor on the horn of the saddle during the journey. The tumor then appeared full in view, but was so large that we could not take it away entire. We put a strong ligature around the Fallopian tube near the uterus, and then cut open the tumor, very much enlarged. We took out fifteen pounds of a dirty, gelatinous-looking substance, after which we cut through the Fallopian tube and extracted the sac, which weighed seven pounds and one half. As soon as the external opening was made, the intestines rushed out upon the table; and so completely was the abdomen filled by the tumor, that they could not be replaced during the operation, which was terminated in about twenty-five minutes. We then turned her upon her left side so as to permit the blood to escape, after which we closed the external opening with the interrupted suture, leaving out the lower end of the incision, the ligature which surrounded the Fallopian tube. Between every two stitches, we put a strip of adhesive plaster, which, by keeping the parts in contact, hastened the healing of the incision. We then applied the usual dressings, put her to bed, and prescribed a strict observance of the antiphlogistic regimen. In five days I visited her and, much to my astonishment, found her engaged in making up her bed. I gave her particular caution for the future, and in twenty-five days, she returned home as she came, in good health which she continues to enjoy."

Mrs. Crawford lived to a good old age. There follows a long list of similar operations, and it would be repetitious to mention them all. But this initial, successful, planned procedure eliminated the former tappings and partial excisions and formed the basis for gynecologic surgery.

In 1823, James Blundell, truly a great pioneer in abdominal surgery and animal experimentation, made the following significant recommendations: excision of portions of the tubes for sterility, or removal of a portion of the cyst wall when extirpation was impossible; removal of the carcinomatous womb when ulcerations first made their appearance; extirpation of a ruptured uterus, and repair of a ruptured bladder. He was also one of the few gynecologists to do vaginal hysterectomy.

Spectacular aid to surgical procedures came in 1846, with the dawn of anesthesia. In 1842 Crawford W. Long (1815-1878) of Jefferson, Georgia, first administered ethyl for the removal of a small tumor of the neck, and in 1844 Horace Wells, a dentist of New Haven, Connecticut, first gave nitrous oxide for the extraction of a tooth. Oliver Wendell Holmes, who was a physician on the Harvard staff, coined the words "anesthesia" and "anesthetic." J. Y. Simpson, on Nov. 4, 1847, on the advice of a druggist, used chloroform in surgery and later in obstetrics, and also for the relief of dysmenorrhea.

In 1866 Joseph Lister introduced surgical antisepsis when he used a carbolic acid spray and solution. Antisepsis in obstetric practice was introduced earlier (1844), by Ignaz Semmelweis (1818-1865), who reduced the mortality rate of puerperal sepsis from 11 to 1 per cent by

having obstetricians wash their hands in a chemical solution before examining or attending a woman in labor. Further innovations followed Lister's work. These included the introduction of extreme cleanliness or asepsis by R. Lawson Tait, steam sterilization of dressings by Ernst von Bergman of Berlin, and rubber gloves by William Stewart Halsted of New York. Of course, Louis Pasteur (1877) and Robert Koch (1878) established a bacteriologic basis for these procedures in order to prevent the introduction of bacteria into operative fields.

As early as 1801 Joseph Claude Anselme Recamier (1774-1852), who was considered the founder of the specialty of gynecology, described the use of the vaginal speculum for treating the exposed parts of the cervix and vagina. His first speculum consisted of a slender tin tube, five inches long; in time, he had to enlarge its diameter. Modifications quickly followed, so that during the present century about four hundred variations have been introduced, being either tubular or volvular.

Recamier, dissatisfied with the exposure of the cervix, introduced the uterine sound and curette to explore the uterine cavity. Although these instruments were great diagnostic aids, they were not generally accepted for some time. Today they are our most commonly used diagnostic instruments. That progressive ideas and procedures often meet with opposition is made evident by the following note: Charles D. Meigs, professor of midwifery and diseases of women and children at Jefferson Medical College, declared in 1848: "We are, in many instances, not permitted to institute the only inquiries that would possibly reveal to us the precise nature and indications of the case. Even after we have been consulted, and when certain concessions are made, there often remains some degree of uncertainty, because we cannot, as we can in persons of our own sex, freely employ every means of research in exploring, and in repeating the explorations of their maladies.

"This difficulty is probably greater in this country than it is in Europe, I am rejoiced at it; because, however inconvenient and however baffling is the particular instance of suffering, it is an evidence of a high and worthy grade of moral feeling. And I hope the day is far distant when the spectacle shall be seen in our hospitals, of troops of women waiting in succession for a public examination of their genitalia, in the presence of large classes of medical practitioners and students of medicine. I regard this public sentiment as to the sanctity of the female modesty and chastity, as one of the strong safeguards of our spontaneous public probity; for woman, and man's respect and love for her are truly at the basis, and are the very cornerstone of civilization and order.

"He is but pander of vice who parades his thousands of uterine cases before the public gaze; and is himself an unchaste man, who ruthlessly insists upon a vaginal taxis in all cases of women's diseases that, however remotely, may seem to have any, the least connection with disorder of their reproductive tissue.

"While I say these things to you, my young friends, I am bound also to say that it will be your painful, even your distressing duty to condescend to the task of making such explorations sometimes."

Even during the late seventies, Howard A. Kelly, while a student at the University of Pennsylvania Hospital Dispensary, was advised by William Goodell to look at the ceiling while making a vaginal examination in order not to embarrass the patient, who was carefully and thoroughly draped.

By 1870, with the aid of the microscope, the classification of cervical malignant tumor had almost reached the one in cur-

rent use. Differentiation between cervical and fundal carcinoma was established.

Charles West of London presented the first report on this subject, stating that, out of one hundred and twenty cases of uterine malignancy, there were fundal growths in two. By 1870, however, no one had either suggested or attempted operative measures. In 1880, T. Gaillard Thomas proposed ablation.

The first text devoted to the sugical treatment of gynecologic diseases appeared in 1854 and was written by Isaac Baker Brown of London. It was entitled "On Some Diseases of Women Admitting of Surgical Treatment." Brown divided gynecologic diseases into two main groups: (1) those resulting directly or indirectly from parturition-rupture of the perineum, prolapse of the vagina, procidentia uteri, vesicovaginal fistula, rectovaginal fistula and lacerated vagina, and (2) those independent of pregnancy-polypus uteri, stone in the bladder, vascular tumor of the meatus urinarius, imperforate hymen, encysted tumors of the labia, diseases of the rectum resulting from certain conditions of the uterus, and ovarian tumors.

Gynecology in the nineteenth century suffered from several waves of etiologic misconception, all of which had their corps of devotees. For some decades, inflammation of the uterus was regarded as the cause of all female ailments, later to be followed by displacements and deviations of the organ as the reason for all pelvic disturbances. Fortunately, there was only a brief period in which clitoridectomy was advocated as a remedial measure for female neuroses; by this same strange bypath came a phase in which normal ovaries were removed. Other misconceptions followed, including the belief that inflammation, ulcerations and lacerations of the cervix were the cause of all female aches and pains.

In 1860, German gynecology held the leadership in pathology, histology and bacteriology. German contributions were unsurpassed until the end of the nineteenth century; three valuable gynecologic journals appeared in 1870 and 1877.

From a practical point of view the gynecology of the nineteenth century was essentially American, beginning with the contributions of Ephraim McDowell (1809), James Marion Sims (1813-1883), the Atlee brothers and Thomas Addis Emmet (1828-1919), who were followed by many others.

Vesicovaginal fistula had been a problem for countless generations, but it was always considered too formidable and discouraging to be given more than sympathy or an occasional attempt at closure. From 1800 to 1850 surgeons began determined attempts to effect a cure. There were many reports and in 1852, A. J. Jolert de Lomballe published a volume of 400 pages dealing with this lesion. In this year James Marion Sims made his epochal contribution which was published in the *American Journal of Medical Science* (23: 59-82, 1852).

The course of events that stimulated Sims' interest in vesicovaginal therapy warrants a more detailed exposition. After accidentally placing a patient in the knee-chest position he retracted the perineum, allowing air to rush in and distend the vagina. This gave a view of the vagina he had never before observed. His story follows:

"If by this position, the atmospheric air can be made to dilate the vagina—why will not the same principle allow me to explore this region, and examine accurately any injury. Full of thought, I hurried home—and the patient (with vesicovaginal fistula) who was to have left the next day, was placed in the position described, with an assistant on each side to elevate and retract the nates. I cannot, nor is it needful to describe my emotions when the air rushed in and dilated the vagina to its greatest capacity, whereby

its whole surface was seen at one view, for the first time by any mortal man. With this sudden flash of light, with the fistulous opening seen in its proper relations, seemingly without any appreciable process of ratiocinations, all the principles of the operation were presented to my mind as clearly as at this time. From this moment, my high resolve was taken. I thought only of relieving the loveliest of all God's creations of one of the most loathsome maladies that can possibly befall poor human nature. Full of sympathy and enthusiasm, thus all at once I found myself running headlong after the very class of sufferers that I had all my professional life most studiously avoided. Building a little hospital as a special field of experiment, I readily got control of these cases, all of them healthy young Negro women. Having no proper instruments, and no instrument-maker, dentists, jewellers and blacksmiths were laid under contribution, and soon such rude instruments were made as were suggested by the peculiar wants of individual cases. This occupied a period from the 9th of December, 1845 to the 10th of January, 1846, when the first operation was performed.

"The fistula was an inch and a quarter long, transverse, in the base of the bladder, with an abundance of tissue. Its edges were accurately adjusted, and I expected to effect at once a magical cure; but greatly to my surprise and mortification, it was a failure. However, the size of the opening was reduced from that seen in the diagram to one not larger than a No. 4 bougie; this encouraged me considerably, and the same operation was tried on another case with a like unfortunate result, and after this, with various and constantly varied modifications on others till each one had suffered numerous operations, but all to no purpose. And thus I worked on—for long weary years, before a single case was cured.

"Soon my friends began to despair of my efforts, and one by one, became tired of such profitless work—I now stood alone—alone! No—for I felt that I had a mission—of Divine origin—nor was I alone in another sense, for I had succeeded in infusing my own courage and enthusiasm into the hearts of the half dozen sufferers who looked to me for help, and implored me to repeat operations so tedious, at that time often so painful that none but a woman could have borne them.

"In my first experiments, the quilled suture was used, securing the ligatures by passing them through little cannulae that projected from the vulva. The rude contrivance was made of silver. The cannulea were firmly soldered to the proximal quill, and when the ligatures were tightened and wrapped around the end that projected from the vagina, the fistulous

Fig. 5.—Repair of vesicovaginal fistula by J. Marion Sims.

edges were neatly coapted by the quills. After using the machine variously modified for nearly three years, giving attention mostly to the perfection of the self-retained catheter, I at last concluded that the projecting cannulae were a chief cause of failure, and consequently determined to dispense with them; but how to secure the ligatures was the question. A detail of the numberless expedients resorted to is useless; suffice it to say that I was at last driven completely to the wall. I had resolved never to repeat another operation for nearly six weeks, and my devoted patients were begging me from day to day to 'try only one more time!' Notwithstanding their importunities, I had determined first to invent a knot for my sutures. My brain was oppressed. At last, I happened to remember that, when as a boy, I used to make sinkers to my fishing lines by cutting a shot half in two, laying the line in the cut, and then compressing the shot on it with my teeth. The idea occurred to me on the night of the 14th of November, 1848. The contemplation of its beauty, simplicity, and perfect adaption to the purpose, gave me a sleepless night; for there I lay with etheralized brain, performing in imagination a magical cure on each of my devoted patients. But bright and early on the succeeding morning I applied the quill sutures secured by the perforated shot. It was all I could desire —but these bright hopes were of short duration, for I soon had unmistakable evidence that the operation was a total failure. What was the cause of it? It must be because the silver quills were too large, so I began to lessen their size—and on account of the expense of silver, lead was substituted; but notwithstanding these modifications, there was no more success than at the beginning.

"Thus far all my experiments were conducted on the principles of a rational inductive philosophy. The operation was mechanically perfect, but with no better results than when it was rude and clumsy. There must be a reason for all this—what was it? 'Why,' said I, 'perhaps it is the nature of the material more than in its principle of action; what a happy thought!' Of course it was, for a silk thread introduced under the skin and allowed to remain a week, becomes a seton, giving rise to the suppurative process, and certainly the same thing must occur with it in the vagina, and how then could there be cohesive union? Here, then, was the difficulty at last; how strange it now seemed to me that this fact had not long ago forced itself upon my mind. Now the question arose, was there a substitute for silk that would answer the same purpose, and yet not poison the animal tissues? Dr. Levert of Mobile had demonstrated the innocuousness and efficacy of leaden ligatures on the arteries in the lower animals, and Metzler and Dieffenbach had actually used leaden sutures in these very cases; and I had, in my very experiments, tried them in two cases; of vesical and one of rectal fistulae, but, unfortunately for science, the clumsy leaden wire was unsuccessful in my hands. Was there any other metal that could be substituted . . . ?

"In this train of inquiry, what would be more readily suggested to the reasoning mind than silver, gold and platinum? Just at that stage of affairs, I happened to pick up a piece of brass wire that had been used in a pair of old-fashioned suspenders made before the days of India rubber; it was as fine as ordinary sewing thread. I took it to a jeweller who imitated it in silver. I was now quite anxious to see the results of an experiment with this. On the 21st of June, 1849, it was done. A young colored woman, who had never murmured at the preceding failures, was placed on the operating table for the thirtieth time, and the silver sutures were applied, with the leaden bars and the perforated

shot—and on the eighth day, the parts were perfectly healed.

"I shall not dwell upon my feelings at this time. At last, I had attained what I had worked for nearly four years; and it was but a few weeks before all cases were cured that had been the subject of experiment for so long a time. I was anxious to get a few more cases to settle some doubtful points, before publishing to the world my discovery.

"Having contracted the chronic disease of a warm climate—and fearing that I might die without the world's reaping the benefit of my labours, I determined to give my experience, crude as it was, to the profession that I loved so much. And, accordingly, in October, 1851, my paper 'On Vesico-Vaginal Fistulae' was dictated and sent to Dr. Isaac Hays, of Philadelphia, who published it in the *American Journal of Medical Science*. Rectovaginal, enterovaginal, and other varieties were now attacked with certain success."

The nature of the uterine fibroids, a common abdominal tumor, was not fully understood up to the close of the eighteenth century. It was confounded with malignant growths, of which it was regarded as a variety. Galen called the hard myoma of the uterus a scleroma. The term "mola" or "mole," which had been used for a long time, was now applied to any strange intrauterine growth. J. Vogel, in 1843, first demonstrated the microscopic resemblance between the uterine wall and tumor growth. Virchow introduced the designation "myoma," while Klob and Rokitansky suggested "fibroid tumor." Many publications appeared on the differentiation of fibroids from malignant disease of the uterus. Treatment, chiefly medical, consisted of bromine and iodine compounds administered for months and years, in combination with mineral spring waters. Other procedures were sloughing, absorption, excision, ècrasement, enucleation and, only as a last resort, gastrotomy, that is, laparotomy. Absorption was sometimes attained by systematic pressure exerted by intrauterine tents of "sponge or sea tangle." Pedunculated fibroids were removed through the cervix by cutting and "white-hot iron" cautery.

Intra-abdominal removal of a fibroid uterus was considered entirely outside the sphere of recognized surgical therapy. As late as 1865, W. H. Byford, a leading Chicago gynecologist, and T. G. Thomas of New York (1868) opposed it. Reports of unsuccessful attempts were published.

In June 1853 Walter Burnham of Lowell, Massachusetts, removed a fibroid uterus for the first time; this was mistakenly believed to be an ovarian cyst. He subsequently performed fifteen amputations for fibroid uterus; there were only three recoveries. The first unsuccessful myomectomy was performed by Augasto Bozzi of London in 1837; the first successful one was credited to Washington L. Atlee in 1844. The first Englishman who successfully performed myomectomy was John Eddison in 1854. The first panhysterectomy, carefully planned, was done by B. Bardenheur in 1881. Mary A. Dixon Jones was first to accomplish it in America in 1888.

It may be surprising to learn that a sacral approach was also used for hysterectomies in the period from 1880 to 1890. The vaginal approach for the removal of a fibroid uterus was used by V. Czerny in 1878. Other measures employed during the latter part of the nineteenth century included removal of both ovaries; electrical treatment, such as bipolar faradization and galvanism, and ligation of the tubal and ovarian vessels or the uterine vessels.

In 1812 John Clarke described a peculiar type of degeneration of the cervix, which, from its appearance, he called cauliflower excrescence. R. Virchow recognized the

peculiar structure and nature of such excrescences, and Carl Meyer of Berlin, in 1851, presented the clearest description of the progress of the disease. In 1878 Ruge and Veit advised excision of tissue for biopsy and microscopic examination, while A. Martin in 1889 tried curetting a malignant ulcer of the cervix and subjecting the tissue to microscopic examination. C. H. Stratz, in 1886, advised investigation of such early symptoms as hemorrhage during or after coitus. Rudolph Chrobak must be credited with directing attention, in 1896, to the development of malignant disease in the cervical stump. Therapeutic measures varied from diet, sanguineous depletion, cupping of the lower part of the abdomen and application of leeches to the cervix to starvation to prevent nourishment of the diseased organ, purgation and vaginal irrigations. Surgical procedures began with cervical amputation by Osiander in 1801 and proceeded to galvanocautery by John Byrne in 1872, vaginal hysterectomy by C. J. M. Langebeck in 1813 and abdominal total hysterectomy by W. H. Freund in 1878. For carcinoma of the cervix, radical abdominal hysterectomy was performed by E. Ries (1895) and Wertheim (1900), and radical vaginal hysterectomy by Shauta.

Before the nineteenth century ectopic pregnancy was recognized only if a patient was studied at autopsy; the only known surviving women were those who had abdominal pregnancies, the fetuses of which had died and later extruded the fetal bones through fistulas in the abdominal wall. Invariably, all the specimens of ectopic pregnancy were seen at autopsy, and all, of course, were ruptured masses with profuse intra-abdominal hemorrhage. Bussiere of Paris (1693), J. Ollivier (d'Angers) (1834) and E. Stanley (1820) were first to observe and describe unruptured tubal gestation. Bussiere's case was that of a woman condemned to death, who had had intercourse with a fellow-prisoner while awaiting execution. At autopsy, the dilated portion of the tube contained an ovum the size of a hazelnut. Ollivier's patient died from rupture of some ovarian varices, while Stanley's patient committed suicide by taking opium five weeks after illicit intercourse.

Many etiologic theories were presented; bizarre cases were reported, but since no laparotomy was carried out the mortality rate was appalling. Procedures at the time encompassed starving of the patient, destruction of the fetus by the injection of drugs and the use of electricity and compression.

The diagnosis of unruptured tubal pregnancy then, as now, was not an easy matter, and no one dared to subject a more or less symptomless patient to the hazards of laparotomy. When rupture occurred, the patient, in most instances, was too poor a surgical risk to warrant intervention and was left to her fate. In 1883, however, R. Lawson Tait of Birmingham, England, operated successfully on a patient with a ruptured pregnancy. The first American operation for this condition was performed in October 1883 by Charles K. Briddon of New York. An immense literature has accumulated since then on the causation, clinical course, combinations, bizarre sites and vaginal and abdominal treatment of ectopic pregnancy. In 1891 Schauta demonstrated that prompt operation in cases of ectopic pregnancy had reduced the mortality rate from 86.9 to 5.7 per cent.

Progress was also made in the treatment of prolapse of the uterus, which has been a problem since ancient times. After the postanesthesia and post-Lister period, pessaries and appliances were replaced by surgical procedures. Surgical treatment was not always anatomic or physiologic and varied from partial to total closure of the vagina, ventrofixation, ventrosuspension, cervical amputation and vaginal hysterectomy.

Concepts of pelvic inflammatory disease held during the first half of the nineteenth century did not differ from beliefs emanating from ancient times. An inflamed pelvis really meant an inflamed uterus, and inflamed adnexae discovered at autopsy were considered purely a secondary manifestation. In the absence of autopsies, the most obvious pelvic inflammatory lesion was a pelvic abscess or a tubo-ovarian abscess that pointed either *per vaginam* or above Poupart's ligament. The earliest descriptions appeared in the texts of Aetius of Amida (502-575) and Paul of Aegina (625-690) and were followed in 1655 by James Primrose. In 1759 Nicholas Puzos, although he appreciated the clinical picture, erroneously considered this ailment due to a superabundance of milk in the system. John Hunter alluded to the condition in 1775 but did not consider it a disposition of milk.

Up to 1840 the causes commonly believed to produce inflammation of the adnexae, independent of the puerperal state, were: (1) a blow or a fall, a wound and contusion in the iliac region; (2) excessive excitement; (3) "sudden refrigeration of the body"; (4) suppression of the menses, or painful and imperfect menstruation; (5) the abuse of emmenagogues; (6) the use of substances designed to produce abortions, and (7) the use of exciting drugs known as aphrodisiacs.

The first real advance came from autopsy studies conducted by Bernutz and Gaupil in 1857. They stated that inflammation of the pelvic peritoneum was a common disease, that the tumor found was formed by the matting together of various pelvic structures as a consequence of inflammation, and that inflammation of the pelvic-serous membrane was always symptomatic of inflamed tubes and ovaries. Disregarding Bernutz' work, the gynecologists talked only of cellulitis and peritonitis. Bernutz' treatment, however, was comparable to our modern methods.

The surgical treatment of purulent diseases of the adnexae centered about colpotomy during the first half of the nineteenth century. Then, late in 1870, laparotomies and removal of the tubes were championed by Joseph Price of Philadelphia. The first removal of tuberculous tubes was undertaken by F. von Mondach and A. Hegar independently in 1883. Lawson Tait removed a hematosalpinx in 1876 and a pyosalpinx and a hydrosalpinx in 1879. Dire consequences, however, followed the invasion of a septic pelvis by laparotomy, despite antisepsis and asepsis. The vaginal route and inguinal incision were introduced. A group of conservative gynecologists (T. Spencer Wells, C. Schroeder, A. Martin, F. Schatz and others) showed that they were able to preserve the child-bearing function by conservative surgical measures. It was only during the early part of the twentieth century that the realization arose that the proper time for invasion of an infected pelvis was an important factor in saving lives and preserving partial or complete generative function. With the introduction of chemotherapy and the antibiotics further control was established; nonetheless, abscesses still require drainage.

With the end of the nineteenth and the beginning of the twentieth century, the importance of physiologic research has come into its own; it has contributed much to our understanding of the endocrine system and the interrelations of the pituitary, thyroid, adrenal and ovarian glands. The corpus luteum function was described by Prenant in 1898 and Fraenkel in 1903. In 1906, Lane-Claypon and Starling established the ovary-breast relation in animals. In 1908, Hitschmann and Adler described the endometrial menstrual cycle histologically and related it to the ovarian cycle. Later came isolation of the ovarian hormones, estrogen (E. Allen and Dorsey, 1924); progesterone (Corner and W. Allen, 193?), and the gonadatropic hor-

mones of the pituitary gland (Aschheim and Zondek). The latest dramatic discovery has been the steroid hormones.

The therapeutic and diagnostic history of radium and roentgen rays began with isolation of the radium salt from uranium in 1898 by the Curies, and Wilhelm Roentgen's demonstration of roentgen rays in 1896. Since 1910 their values and limitations have been gradually established. Robert Abbe of New York introduced the use of radium in the treatment of carcinoma of the uterus.

Sampson established the true nature of endometriosis in 1922.

The progress of studies on infertility and sterility was stimulated by Rubin's tubal insufflation investigations. Hysterosalpingography and the advanced knowledge of physiology have come to the fore since 1910.

Cytologic studies by Papanicolaou and his workers since 1917 have contributed an important diagnostic method.

The development of atomic products and the use of isotopes are important aids in gynecology.

In conclusion, therefore, it may be said that the history of gynecology encompasses the history and development of anatomy, physiology, pathology, symptomatology, diagnosis and treatment of the female generative tract, and its relation and influence to the rest of the body, as well as the reciprocal action of the body on this system.

It is of significance, of course, to know who is the father of any important discovery, but in the spirit of strict justice it is of equal interest to know who is the mother and who is the obstetrician who assisted in bringing it forth into the world.

It happens with scientific discoveries, as with literary works, that once the umbilical cord joining them with the mind of their creator is cut, they cease to belong to one person, and they take on a life of their own, ready to grow and change. The original and true features can then be appreciated only if we look at their reflection in the mirror of their creator's own mind.

How instructive it would be, for instance, if the great figures of the past in psychiatry could tell us what they think of their own discoveries re-evaluated in the light of our present-day knowledge! What a lesson in humility and tolerance it would be for many "Freudian" dogmatists if Freud himself were to give us a new estimation of his psychoanalytic theories in the light of the new biologic signposts in psychiatry!

Marti-Ibañez

Nicholas Senn, Pioneer

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ABOUT four thousand years ago the medical center of the world was located in Mesopotamia. This small country at the eastern end of the Mediterranean was also the center of civilization and the center of transportation. Through this land of the Tigris and Euphrates, all eastbound traffic of the Mediterranean and northbound traffic from Egypt found its way. It was natural, then, that this little country became the clearing-house for everything new, and it was here that among merchants, priests, craftsmen and scribes the modern physician was born.

Strange as it may seem, it was almost four thousand years before the next true advances were made in medicine. Again it was men of great wisdom and courage, working in an area located at the crossroads of a great nation, who shook off the beliefs, the rituals and the magic that represented medical care in that era.

Dr. Nicholas Senn

Chicago in the nineteenth century, as it is today, was the transportation and communication center of the United States. Most of the national culture and knowledge, as it gradually moved from east to west, passed through this city. What more natural spot could be found to filter out the ritual and ignorance? This was the place to substitute wisdom, science and research. It was here that sensible pronouncements were permitted to stand; problems were thrashed out; and the chaff was thrown to the winds. This area, like Mesopotamia forty centuries earlier, sits astride the routes of travel by water, land and nowadays, air, and is open to all the illnesses and plagues carried by man or beast. Since the advent of the St. Lawrence seaway there is already a new alertness, a fear of diseases brought directly from foreign shores, that may stimulate a new look at preventive medicine, and new heroes may be born.

It was to this region, the passageway to the west, that Nicholas Senn came at the age of eight from Switzerland in 1852. His restlessness and his passion for progress can be understood by a statement with which he opened a paper in 1893: "We live in an age of great unrest in medical literature. Books written only yesterday are old today."

In looking over the history of medicine, it is difficult at first to believe that so

little progress was made between the eras of Tiglath-Pileser and what we choose to call the modern era of the nineteenth century. When a Mesopotamian became ill, it was popularly believed that either he or one of his family had committed a sin. The illness therefore was punishment, ordered by the gods and meted out by demons. That is why physicians needed to be priests and medicine was taught in the temple. Besides reading, writing, science, religion and literature, the physician-priest needed a knowledge of magic, divination and astrology. His task was to treat the sick with charms, drugs and minor operations. His fees were regulated by law; so were the penalties if his treatment caused death or injury. There were no courts of law in which the patient could sue for malpractice, so the law provided for the cutting off of the physician's hands, or some other reminder if he was a failure.

Physicians used fumigation, medicated baths, hot and cold water. They recognized a great many common illnesses, including jaundice, rheumatism, tumors and respiratory ailments. Hematuria was known to be associated with a syndrome now known as bilharziasis. Enemas and purgatives were used extensively to prevent the absorption of decayed fecal contents. Drugs were given in anal suppositories or were blown into the urethra through a tube. Apparently chiropractic existed then, because one reads of manipulations of the spine. Certain days each month were set aside on which the physician made no calls. This is probably the origin of the modern "Wednesday afternoon off." No emergency call panels or grievance committees existed. The penalties inflicted upon physicians for failure to produce a cure is good evidence that the public relations of physicians of that era were even worse than those we "enjoy" today.

Now that we have a picture of medicine as it was practiced in Babylon and Nineveh, let us look at the situation that confronted young Dr. Nicholas Senn when he graduated from Chicago Medical College in 1868.

A glance into the history of the late nineteenth and early twentieth centuries reveals that the sanitation prevailing left much to be desired. A great deal of the drinking water came from wells that were not adequately protected. The community drinking cup was still in vogue. Outdoor "plumbing" was still in use. Health departments had a much more difficult time policing public eating places than they have today. The disposal of waste from the sick was almost impossible; in many instances it was just dumped out in the back yard.

Tuberculosis was known to be contagious as early as the fourth century B.C. Celsus, about the same time, recommended life at sea. In the fifth century B.C. Hippocrates recognized the value of early treatment of tuberculosis. Galen, in the second century A.D., again warned against contagion. Yet in Nicholas Senn's time the profession had not gone much farther. The fresh air treatment was still in vogue. Children went to outdoor schools, winter and summer, at the tuberculosis hospitals. Adults were treated in outdoor hospitals or, if they stayed at home, arranged an outdoor isolation unit for themselves. This represented a recognition of contagion, which, according to Aristotle, had been recognized by the Greeks as early as the fourth century B.C.

Contagious disease in Senn's time was rampant. Differential diagnosis was extremely important, because a child or a young adult with a fever, abdominal pain, nausea and vomiting, operated upon for appendicitis and having a normal appendix removed, might, the next day, have full-blown scarlet fever. Today such an

error in diagnosis usually results in nothing worse than an excuse for another blast by one of our colleagues in a weekly newsmagazine.

Now that we have a picture of the era in which Nicholas Senn lived, we can imagine what his problems were. It is also apparent that some of his problems in the forty years from 1868 to 1908 were about the same as those that confronted the physician in the time of Nebuchadnezzar. In many ways Nicholas Senn and his colleagues accomplished as much during forty years as had been accomplished in the preceding four thousand.

Let us document a little of his life, some of his accomplishments and some of his philosophy.

Nicholas Senn was born in the Canton of St. Gaul, Switzerland, on Oct. 31, 1844. In 1852 the family moved to Washington County, Wisconsin. In 1868, at the age of 24, he received his medical degree from Chicago Medical College, which is now Northwestern University Medical School, and then served as an intern at Cook County Hospital for eighteen months. After this he practiced at Ashford, Wisconsin, where his first son was born on Nov. 18, 1869. Six years later, about 1876, he moved to Milwaukee. In 1877 he visited Europe, and in the following year he graduated *cum laude* from the University of Munich. Several years after his return from Europe he was appointed professor of surgery at the College of Physicians and Surgeons of Chicago, but for some time he continued to live in Milwaukee.

In Milwaukee, it is said, he had a laboratory constructed under the sidewalk and connected to his office building. Night after night for years he carried on his original investigations and dissections of guinea pigs, rabbits, sheep, calves and human cadavers.

In 1888 he was elected to the chair of Principles of Surgery and Surgical Pathology in Rush Medical College, and one year later he succeeded the late Dr. Charles T. Parkes in the Chair of Surgery and Clinical Surgery at Rush.

In 1892 he founded and was the first President of the Association of Military Surgeons of the National Guard.

In 1894 he was President of the Chicago Medical Society. In 1897 he was President of the American Medical Association.

He was professor of surgery at Rush Medical College and at Chicago Polyclinic. He was Surgeon-in-Chief at St. Joseph's and Presbyterian Hospitals.

His early work in experimental surgery made him foremost in his field. His research on intestinal perforations and on gunshot wounds added greatly to general knowledge in this field. He was the foremost military surgeon of his day. He introduced the use of decalcified bone plates in intestinal anastomosis. He developed modern ideas in the management of surgical tuberculosis.

A lasting monument to his memory is the "Senn collection," a medical library valued at $50,000, which he gave to Newberry Library and which was later transferred to John Crerar Library. Even with all his travels and extracurricular activities he must have been a fairly busy surgeon and financially successful, for he presented a clinical building to Rush Medical College. He gave $25,000 to endow the Senn professorship of surgery at Rush Medical College and $35,000 to endow a room for perpetual care of members of the medical profession at St. Joseph's.

He traveled extensively and wrote many articles about his visits to other countries. On one of these trips, while ascending the Andes, Dr. Senn was stricken with dilation of the heart. He died on Jan. 12, 1908.

To achieve a full understanding of his energy and philosophy, let us review some quotations from the writings of Nicholas

Senn, or quotations from those who knew him well.

S. M. Wylie, in his biography of Nicholas Senn, says, "Senn lived in an epoch-making period of surgical discovery, and was quick to recognize its importance and to seize upon its wonderful opportunities. Old untenable theories were to be exploded; dogmas that had received the sanction of ages were to be overthrown. He was hunting for ultimate causes and for the basic principles that underlie or determine or modify disease."

Senn himself, on assuming the chair of surgery at Rush Medical College in 1889, said, "I am fully conscious of the fact that I am coming at a time when the methods of teaching are undergoing a radical change. In the future recitations will largely take the place of didactic lectures."

In 1889, in a paper on appendicitis, Senn made the observation that almost all surgeons are agreed that operation is necessary when it has been established beyond a doubt that perforation has taken place. Then he said, "The principal object in writing this paper is to call the attention of the profession to the necessity of treating the *primary* disease of the appendix by radical measures before the advent of incurable complications: that is, before perforation has occurred." He then describes the symptom complex we recognize today.

In 1901 he presented a paper entitled "Present Status of the Carcinoma Question." This paper sounds as though it had been written today. Senn quotes a number of eastern surgeons who prove by statistics that carcinoma is on the increase. He then goes on to show that "more accurate diagnosis, more frequent postmortems, a more general resort to operative interference and increased longevity are some of the more important arguments in proving the relative increase in carcinoma."

On the inoculation of carcinoma, Senn described an operation that he had performed upon himself to place a fragment of carcinoma from the lower lip of a patient into his own forearm. He seemed disappointed that the experiment was a failure.

On treatment he said, in 1901, "As we are still ignorant concerning the essential etiology and true nature of carcinoma, the treatment pursued up to the present time has been largely of a palliative, tentative and empirical nature. The only real advances made have been in its operative treatment. . . . It is true that from time to time remedies have been proposed for which specific curative properties were claimed."

He then filled several pages with discussions of various serums, pastes and internal medications, much as we hear of them today. He concluded, "The early and radical operative treatment in carcinoma offers the only prospect in permanently eliminating the disease."

In a paper entitled "The Physician as a Scientist" he said: "Combined with science, medicine is the noblest of all professions; without science it is the meanest of all trades."

In the Crerar Library there exists a time-worn document signed by many prominent men, entitled, "Protest Against Resignation from Rush." All would recognize many of the names signed to this document.

Senn High School in Chicago was named in honor of Nicholas Senn.

A paper called "The Good Samaritan" is a notable tribute to the American White Cross First Aid Society.

Lucy Waite, M.D., in a monograph published under the auspices of the Nicholas Senn Club in 1909, called "Gems from the Literary Works of Nicholas Senn," quotes Senn as follows: "The surgeon who understands the principles and practice of good

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cooking is of more service to the troops than the one who can repeat, word for word, the contents of the most exhaustive treatise on materia medica and therapeutics."

In his annual address before the Wisconsin State Medical Society in 1879, at which time he was president of that body, Senn, speaking on medical legislation, said: "The object of medical legislation should be to protect the educated physician, to sustain the honor of the profession, and to guard the people against the impositions of ignorant pretenders." He made a strong point of the fact that the teachers should not be authorized to license a physician, since the teacher's income depends upon the number of students he could graduate and license.

His baccalaureate sermon before the graduating class at Rush on Sunday, June 1, 1901, finished with these words:

"Gentlemen of the Graduating Class: You have finished your studies and are about to enter the ranks of a noble profession. Money, reputation and fame should not influence you in your conduct toward your patients. Remember that your profession always has been, is now, and always will be, noted for its charity to the deserving poor; and that your main object in the life before you should be to promote science, elevate and protect the dignity of your profession, prevent disease, prolong life, alleviate suffering—duties which if well performed, will entitle you to occupy the highest position attainable by mortal man."

Up to now we have had a glimpse of the man, the philosopher, the surgeon and the teacher. Let us presume for a moment or two that Nicholas Senn is with us today. What would be his response to the trends of the time?

He would most certainly be of tremendous help to the Founder of the International College of Surgeons. He and Dr. Max Thorek would make a great team of world travelers.

What would Dr. Senn think of present-day medical education? Would he cut down on the premedical years? Would he add to the clinical years? What would he think of our method of developing surgical specialists? Would he think that the old method of general practice, followed by a preceptorship or postgraduate study, was superior to our present method? Would he criticize the residency that is available only to the young man who has the time and the money to serve a full four years after internship? Would he criticize the fact that a student is forced to choose his specialty before he has had an opportunity to practice medicine, and thus is frequently unsuited for a specialty selected in haste?

What about the future of surgery? Dr. Senn would no doubt be the first to take a good look; if he were here, what would he see? The incidence of appendicitis, according to personal observation and numerous articles appearing in the literature, is down about 50 per cent. The frequency of acute cholecystitis is greatly reduced. Operation for obstruction of the small bowel due to old peritonitis or a previous operation is almost extinct. Pelvic inflammatory disease and hysterectomies done for a painful pelvis, metritis, parametritis or endocervicitis have been greatly reduced by the antibiotics. Perineal repairs are much less frequent in this era of good obstetrics. Gastric operations for a complication of ulcer may be on the decline, because today's management reduces the incidence of the complication that requires it. Cardiac surgical measures to correct the results of rheumatic fever will be no more in a few years, if antibiotics continue to control the infection. Operation for tuberculosis is giving way to drugs. Hernias, the direct inguinal type, should be and probably are on the

decline with the advent of the lift truck and the lifting tail gate which substitutes for the old "heave-ho, up she comes."

Maybe the surgeons of our age have seen the golden age of surgery. After World War II, in the era of prosperity, when antibiotics permitted us to perform heroic procedures, and before the day when antibiotics eliminated the need for surgical intervention, we, who sought our livelihood in general surgery, prospered. It can't last forever. When the cure is found for carcinoma, there may be no surgery except for congenital deformities and trauma. Perhaps we should advise our sons to become orthopedic or plastic surgeons. The day of the general surgeon may be passing.

We have looked at the surgery of ancient times, we have reviewed the past, we have known the present, and we have taken a look into the future. We have reviewed the life of Nicholas Senn and have seen him in a brief forty years as a physician who influenced immeasurably the practice of medicine, so that this era at the turn of the century must be recognized as an era of great progress, triumphant against tremendous odds.

Nicholas Senn died as he lived, climbing a mountain.

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We are all dietetic sinners; only a small percent of what we eat nourishes us, the balance goes to waste and loss of energy.

One pancake for lunch and half a boiled egg for dinner makes a man at sixty able to do anything a college athlete can do.

—*Osler*

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however is not to be taken as criticism of the merit of the book.

The Surgeon's Tale: The Store of Modern Surgery. By Robert G. Richardson, New York: Charles Scribner's Sons, 1959. Pp. 278, with 45 illustrations.

History of American Medicine (MD International Symposia). Edited by Felix Marti-Ibañez. New York: MD Publications, 1959. Pp. 181.

Spinal Cord Compression. By I. M. Tarlov. Springfield, Ill.: Charles C Thomas, Publisher, 1957. Pp. 147, with 41 illustrations.

Le Diagnostic du Cancer d'Estomac a la Periode Utile (Diagnosis of Carcinoma of the Stomach at the Time Most Favorable for Treatment). By Rene A. Gutmann. Paris: G. Doin et Cie, 1956. Pp. 257.

Operative Surgery. Edited by Charles Rob and Rodney Smith. London: Butterworth & Co., Ltd.; Philadelphia, F. A. Davis Co., 1956. Vols. 1 and 2 of 8 (plus index). Profusely illustrated.

Pathology and Surgery of the Veins of the Lower Limbs. By Harold Dodd and Frank Cockett. Baltimore: The Williams & Wilkins Company, 1957. Pp. 462, illustrated.

Functional Bracing of the Upper Extremities. By Miles H. Anderson. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 463. Illustrated.

The Clinical Management of Varicose Veins. By David Woolfolk Barrow. New York: Paul B. Hoeber, 1957. Pp. 167, with 70 illustrations.

Tumors and Tumorous Conditions of the Bones and Joints. By Henry L. Jaffe. Philadelphia: Lea & Febiger, 1958. Pp. 629, with 194 illustrations. *Reviewed in this issue.*

Principles of Disability Evaluation. By Wilmer Cauthorn Smith. Philadelphia: The J. B. Lippincott Company, 1959. Pp. 210. *Reviewed in this issue.*

Surgery of the Colon. By E. S. R. Hughes. Baltimore: The Williams & Wilkins Company, 1959. Pp. 416, with 234 illustrations. *Reviewed in this issue.*

A Synopsis of Obstetrics and Gynaecology. By Aleck W. Bourne. Bristol: John Wright and Sons, Ltd., 1959. 12th ed. Pp. 632, with 167 illustrations. *Reviewed in this issue.*

The Law of Medical Practice. By Burke Shartel and Marcus L. Plant. Springfield, Illinois: Charles C Thomas, Publisher, 1959. Pp. 445. *Reviewed in this issue.*

Office Orthopaedics. By Lewis Cozen. Philadelphia: Lee & Febiger, 1959. 3rd ed. Pp. 431, with 321 illustrations. *Reviewed in this issue.*

Medical Management of the Menopause. By Minnie B. Goldberg. New York: Grune and Stratton, 1959. Pp. 98. *Reviewed in this issue.*

Handbook of Psychology. Section 1, Vol. I: Neurophysiology. Edited by John Field, H. W. Magoun and Victor E. Hall. Baltimore: The Williams & Wilkins Company, 1959. Pp. 779, with 449 illustrations. *Reviewed in this issue.*

Handbook of Psychology. Section 1, Vol. I: Neurophysiology. Edited by John Field, H. W. Magoun and Victor E. Hall. Baltimore: The Williams & Wilkins Company 1959. Pp. 779, with 449 illustrations.

This is the first volume of a new handbook of physiology sponsored by the American Physiological Society. Appropriately, it deals with the nervous system, by which the activities of other portions of the body are coordinated and controlled. There are 31 chapters, written by 35 contributors. The opening chapter by Mary A. B. Brazier, on the historical development of neurophysiology, is not only well written and well organized but thorough and will be valuable to everyone interested in the history of physiology and medicine.

Neurone physiology is covered in seven chapters and brain potentials and rhythms in six. The section on sensory mechanism comprises ten chapters. After an introduction and a chapter on sensory receptors (nonphotic) in lower forms, touch and kinesthesis, thermal sensations, pain, taste, smell, vestibular mechanisms and auditory receptors and central mechanisms are taken up in separate chapters. Another section of six chapters is given over to the physiologic aspects of vision. In the final chapter Robert B. Livingston summarizes current knowledge of the central control of receptors and sensory transmission systems. An excellent index comprises 17 pages.

This is essentially a reference work. Many clinicians will be dismayed by the first two sections, since a considerable knowledge of modern physics, chemistry and electrophysiology is essential to the understanding of these chapters. It should not be assumed that the latter part of the book is less scholarly, but the subjects dealt with therein have more direct practical interest to the clinician.

The neurophysiologist cannot afford to be without this book. The otologist, the ophthalmologist, the neurologist and the neurosurgeon will all find it an important reference work. Taken as a whole, it contains in a single volume the presently available fact and theory of the physiology of the nervous system. The editors are to be congratulated.

HAROLD C. VORIS, M.D.

The Law of Medical Practice. By Burke Shartel and Marcus L. Plant. Springfield, Illinois: Charles C Thomas, Publisher, 1959. Pp. 445.

Written by two professors of law at the University of Michigan, this extremely lucid text is intended not to make every doctor his own lawyer but to inform him of the legal aspects of medical practice—what are his rights, his obligations, his liabilities; in other words, how to keep himself out of legal pitfalls and when to seek legal advice.

The text covers all situations of a *general* nature, with ample citation of court decisions. Many confusing questions are answered, and there is an extensive bibliography for further study.

In these days of increasingly complicated involvement of professional service, the book is most highly recommended to both the medical and the legal practitioner for their separate and mutual benefit.

MAX THOREK, M.D.

A Synopsis of Obstetrics and Gynaecology. By Aleck W. Bourne. Bristol: John Wright and Sons, Ltd., 1959. 12th ed. Pp. 632, with 167 illustrations.

This is the twelfth edition of this useful book to be published since 1913. The section on obstetrics occupies 345 pages; the section devoted to gynecology, 240 pages. Considerable outdated material has been removed, and many new data have been added. The book is definitely up to date.

All the information is presented in outline form, as the title indicates. There are numer-

ous illustrations, and, though all of them are tiny drawings, they are clear and instructive. A good deal is said about postmaturity, even though most American obstetricians are not worried too much about this condition, and I suspect that Bourne also is not often upset by postmaturity. In the section on anesthesia the author says, "Spinal anesthesia has a vogue in certain American clinics but is seldom used in Britain for normal labour." The author uses the term "transverse position" rather than "transverse lie" or "shoulder presentation," which seems preferable to me. The section on fibrinogenopenia is excellent and up to date. There is also a very modern chapter on pelvic tuberculosis. The index is remarkably complete and greatly enhances the value of the book.

There is no doubt whatever that the new edition will increase still more the popularity of this outstanding book. It is packed with important and useful information about both obstetrics and gynecology. The author is to be congratulated for keeping this book in the forefront of obstetric and gynecologic literature for forty-six years.

J. P. GREENHILL, M.D.

Tumors and Tumorous Conditions of the Bones and Joints. By Henry L. Jaffe. Philadelphia: Lea & Febiger, 1958. Pp. 629, with 194 illustrations.

This authoritative text presents an integrated study of the tumors and tumorous conditions affecting the bones and joints. In its correlation of the data—clinical, roentgenographic and pathologic—the book is important, and is of value to general surgeons, orthopedic surgeons, radiologists and pathologists alike. It considers not only the primary tumors and other tumorous conditions affecting bones and joints but tumors metastatic to the skeleton, tumors developing in bone at sites of damage from noxious agents, and tumors invading bone from overlying soft parts.

Careful attention is given to the diagnostic approach and the problems of differential diagnosis.

The text is concise and explicit. It covers the full range of the subject, including some types of tumorous conditions not previously presented in a text of this kind, such as juxtacortical chondroma, juxtacortical osteogenic sarcoma, fibrous cortical defect, desmoplastic fibroma, and benign osteoblastoma.

The illustrations — roentgenograms and photographs portraying the gross and microscopic changes discussed—are explained in detail.

The author, an acknowledged authority on his subject, gives due credit to others in the field, and their contributions are cited.

The index is thorough, and the book-making excellent.

This text, with its fresh and contemporary view of its subject, is sound, practical, complete and informative, and is recommended to all general surgeons as well as specialists.

MAX THOREK, M.D.

Office Orthopaedics. By Lewis Cozen. Philadelphia: Lee & Febiger, 1959. 3rd ed. Pp. 431, with 321 illustrations.

This is the third edition of a book that is quite valuable for general practitioners and general surgeons who are called upon to treat orthopedic problems in their offices. The format and chapter titles are the same as in the previous editions, but the treatment has been brought up to date, including many indications for hydrocortone injections. More and more improved illustrations have also been added.

Many chapters include an adequate synopsis of differential diagnosis, to be considered in the case of a presenting complaint, such as a limp in a child, a painful arm or leg in a child, and the case of the child who is unable to sit up or who has an abnormal leg or arm. In addition, the author has included a resume of the diagnosis to be considered when an adult complains of pain, weakness or coldness and pain in an arm or a leg.

The section entitled "Orthopaedic Cases for Law Court" is particularly well done and should aid any surgeon who has made only an occasional court appearance to present a clear picture of the patient's disability.

ROBERT G. THOMPSON, M.D.

Medical Management of the Menopause. By Minnie B. Goldberg. New York: Grune and Stratton, 1959. Pp. 98.

The author wrote this small book because her clinical practice, bridging both the prehormonal and the hormonal era, has convinced her of the great boon of hormonal therapy for disturbances associated with the menopause. She successfully disproves the baseless and unproved fear of some physicians that the estrogens are responsible for carcinoma in women.

The book contains a great deal of useful information about treatment of the change of life. There are lists of the common commercial preparations of estrogens, androgens, combined estrogen-androgen preparations and progestins, with their trade names, the firms that manufacture them, the generic names, the effective doses and their advantages and disadvantages. This is definitely a worthwhile book.

J. P. GREENHILL, M.D.

Surgery of the Colon. By E. S. R. Hughes. Baltimore: The Williams & Wilkins Company, 1959. Pp. 416, with 234 illustrations.

This monograph is a sequel to *Surgery of the Anus, Anal Canal and Rectum.* The author, cognizant of the literature available, has written this book on the basis of his vast personal experience. This reviewer agrees heartily with Mr. Hughes when he states, "It is regrettable that clinicians interested in gastrointestinal diseases have allowed themselves to remain divided into physicians and surgeons." Although some phases of the book are quite technical, the author has also gone into the details of the all-important subject of chronic constipation. Too often, in studies of this condition, the so-called "simple or elemental" is overlooked. For particular commendation should be mentioned Chapter Five, "General Principles and Technique in Large-bowl Surgery." Figures 49 through 54, depicting the placement of anastomotic sutures, are especially lucid. References are listed at the end of each chapter; the author and subject indices are excellent. This book can be recommended to anyone interested in diseases of the colon, be he physician, surgeon, or student.

PHILIP THOREK, M.D.

Principles of Disability Evaluation. By Wilmer Cauthorn Smith. Philadelphia: The J. B. Lippincott Company, 1959. Pp. 210.

This work is divided into four sections, of which one is an introduction to the subject and consists of 33 pages. It touches on the growing concept of disability compensation and the increasing medical obligation to furnish advice concerning disabilities. It ends with a discussion of medical testimony, indicating the need for pre-trial conference and the conduct of the expert witness while on the stand.

Section 2 covers the nature of disability. In this dissertation the author utilizes approximately 15 pages, discussing the causes, effects and the permanence of disability, pointing out the uses and abuses of adequate time for healing and treatment.

Section 3 deals entirely with the relation of the disability to the alleged occurrence, and the author utilizes approximately 40 pages in this portion of the book.

Section 4 is devoted to the evaluation of disability, and here the author utilizes approximately 100 pages of the book, in which he covers the modes of determining what each disability may mean to the patient and the available methods of translating the meaning to a proper evaluation report. He touches upon disfigurement, functional states, cardiorespiratory injuries and practically everything that can become pertinent in a controversial case.

The book is well worth reading.

H. E. TURNER, M.D.

Abstracts from Current Literature

Pediatric Neurosurgery. By I. J. Jackson and R. K. Thompson. Springfield, Ill.: Charles C Thomas, Publisher, 1959. Pp. 564, with 186 illustrations.

This book is the work of twenty-four contributors, the majority of them young and active neurosurgeons. The entire field of neurologic surgery is covered in the 21 chapters, even such relatively unimportant subjects in pediatric surgery as involuntary movements, mental illness and epilepsy.

The book is divided into two parts. The first seven chapters deal with general considerations related to pediatric neurosurgery and include two chapters by the editors. The chapter by Panos on the principles of preoperative and postoperative care is outstanding in this section. The next 14 chapters are devoted to specific neurosurgical entities. The treatment of congenital malformations by Meacham, intracranial vascular malformations by Mount and intracranial and cranial tumors by French is especially well handled. The three chapters on trauma, by Gordy, Mabon, and Gay respectively, are also well done.

Repetition has been avoided much better than in many books by multiple contributors, but, as was to be expected, some subjects are presented in more detail than their importance warrants, while other more important ones are given less space. Examples of this are the chapters on diagnostic technics (10 pages) and electrodiagnostic methods (15 pages). The relative familiarity of neurosurgeons with surgical diagnostic procedures may be advanced as a reason for the almost synoptic presentation of these methods, but the medical student, the intern, the resident or even the pediatrician might well profit by a more extensive consideration of lumbar, cisternal, subdural and ventricular punctures and electroencephalographic, ventriculographic, myelographic and angiographic technics. The indications and contraindications for these procedures are not sufficiently stressed.

This book will be compared with that by Ingraham and Matson issued by the same publisher five years ago. It does not suffer by the comparison. The editors have planned a book by a large group of contributors representing not only neurosurgery but auxiliary specialties, which would cover the entire field of pediatric neurosurgery. Within the natural limitations of such a plan, they have done an excellent job. The work can be recommended to everyone interested in the care of children.

HAROLD C. VORIS, M.D.

The Syndrome of Laceration of the Broad Ligament. Varangot, J., and others, Presse Med. 67:1139, 1959.

In 1955, W. H. Masters and W. H. Allen of Washington University in St. Louis described a new clinical syndrome, which they called "traumatic laceration of the uterine support." They described a retroverted uterus due to abnormal mobility at the neck. They called this a "universal joint cervix." This type of cervix injury during childbirth, or injury during the performance of a dilation and curettage, is common. A bilateral tear usually occurs in the posterior leaf of the broad ligament. This, it is postulated, leads to lack of support for the uterus and is somewhat analagous to herniation. As a result of this, pelvic congestion occurs and causes many of the symptoms, such as abdominal and pelvic pain when the fundus is moved during intercourse, excessive premenstrual pain and dysmenorrhea. Weakness and fatigue develop because of the constant pelvic pain.

The authors review 30 cases observed in their own practice. They have divided the clinical syndrome into three parts: (1) etiologic factors; (2) clinical features, and (3) anatomic observations.

Either a traumatic delivery or a dilation and curettage is usually noted in the recent history. Complaints consist of abdominal and pelvic pain accentuated by intercourse, dyspareunia, dysmenorrhea and tiredness. An abnormally mobile cervix and a retroverted fundus are often encountered on pelvic exami-

nation. At operation a tear is usually observed in the posterior leaf of the broad ligament on each side. This involves the peritoneum and the fascia beneath it. A varicocele may be obvious, and there is a little free fluid in the pouch of Douglas. One type of tear is quite definite; the other is merely suspected because the peritoneal layer is thin and a varicocele can be seen deep in relation to it.

The forceful manipulation of a gravid uterus or the onset of puberty in a girl with a congenitally retroverted uterus may also cause the syndrome. The simplicity of repair by simple approximation is stressed. A two-layer closure is performed, and the operation is completed by suspending the uterine fundus.

THOMAS A. MCLENNAN, M.D.

Suprapubic Vesicourethral Suspension for Stress Incontinence in Women. Uhle, C. A.W., Bradley, R. H., Jr., and MacKinney, C. C., J. Urol. 81:749, 1959.

Urinary stress incontinence is a common female complaint and is estimated to affect approximately 5 per cent of all adult women. For surgical correction of this condition, patients should be carefully selected and an accurate preoperative diagnosis made. A complete urologic survey is most important. The urethral elevation or stress test is most important, but it is not an infallible presumptive diagnostic sign.

The intelligent application of this operative technic is a valuable addition to the treatment of this common and distressing condition.

EDMUND LISSACK, M.D.

Observations on the Relationship of Benign Adenomatous Polyps of the Colon to the Natural History of Colonic Cancer. Cole, J. W.; O'Hara, R. S., and Holden, W. D., Surg., Gynec. & Obst. 108:651, 1958.

A follow-up study of two groups of patients undergoing curative resection for adenocarcinoma of the colon and rectum was undertaken. One group had associated adenomatous polyps; the other group apparently did not.

The results of the study indicate that the polyp-forming group had a 75 per cent chance of being alive six years after the resection, as compared to 46 per cent for patients without polyps.

The possible implications of these observations are discussed. It is recognized that a larger group of patients must be studied to confirm the hypothesis, even though these data have statistical significance.

WILLIAM E. NORTH, M.D.

Correction of Fistula of Stensen's Duct by Wire Seton. Erwin, J. H., Surg., Gynec. & Obst. 109:247, 1959.

External salivary fistula, a complication of surgical procedures in or near the parotid gland, has been treated by many surgical technics in addition to the use of roentgen rays for the suppression of secretory activity in the residual gland.

Many of the surgical technics have been ingenious and the results often excellent, although repeated and prolonged attempts to produce surgical correction have been frequently reported. The present short article reports a single case in which successful correction was achieved by a method previously described (1955) by Fishler and Pogorel.

The small operative procedure was carried out easily with the aid of infiltration analgesia. It consisted of the placement of a U-shaped piece of No. 7 tonsil wire into the cheek to straddle the cutaneous opening of the fistula. The wire was fixed in place by twisting it within the mouth. The patient was protected with a standard dose of tetanus antitoxin and the administration of a broad spectrum antibiotic. Approximately three weeks later, after the swelling in the cheek had subsided and the small loop of wire had become proportionally looser, it was tightened within the mouth. Approximately one month thereafter the skin had completely healed, and the wire was cut and removed through the mouth. There was no further external salivary drainage. The new opening was clearly visible, and a free flow of saliva from it was readily observed.

This simple procedure, utilizing the necrosing ligature concept, is deserving of careful consideration in similar situations.

THOMAS WILENSKY, M.D.

Evaluation of Current Surgical Therapy for Peptic Ulcer. Judd, E. S., J. M. A. Alabama 27:340, 1958.

Critical evaluation of the management of duodenal ulcer indicates that it is largely a nonsurgical problem. Only when the ulcer is out of hand should the surgeon be called on to attempt to control it.

In deciding which operation to employ, the patient's racial and emotional characteristics are highly important, and persons known to have come from environments of stress require a much more radical approach. Although duodenal ulcer is less common in women than in men one often finds among them a relatively more complicated situation, requiring more extensive treatment. For young persons more extensive surgical treatment is indicated than for octogenarians. The choice of operation is affected also by the patient's occupation, gastric acidity studies, the degree of gastritis present, duodenal deformity and multiplicity of lesions. Perhaps the most important consideration of all is the technical difficulty.

Vagotomy plus pyloroplasty is used in some centers routinely, but the results have been so much at variance with the authors' that they were persuaded to do a different operation. They perform vagotomy with gastroenterostomy on patients with: (a) technical problems, such as obesity, extreme inflammatory change in the duodenum involving the pancreas or biliary system, or postoperative adhesive states; (b) finicky appetite, and (c) stenosis of the pyloric region in the elderly.

In their hospital, gastric resection remains definitely the most satisfactory operation. By its use, control of the acid-pepsin factor is accomplished in large part. The hormonal control elaborated by the antrum is eliminated completely, although the "cephalic phase" is still present. On a theoretical basis at least, since the gastric remnant has a reduced number of acid cells and since the alkaline intestinal content is constantly delivered into the gastric remnant, an ideal situation has been brought about through surgical treatment. "We are the first to admit," say the authors, "that this ideal is not achieved in anywhere near 100 per cent of the cases." They remove the ulcer when it can be done safely.

Hemigastrectomy plus vagotomy is being used and appraised for patients who might well have been candidates for great nutritional problems after the operation but who needed more radical treatment than simple vagotomy plus gastroenterostomy.

They do not often employ the Billroth I resection for duodenal ulcer, reserving it for elderly patients or patients with acutely perforated duodenal ulcer and gastrojejunal ulcer.

For gastric ulcer, surgical treatment has no peer, and the Billroth I operation for benign gastric ulcer holds a firm place.

Excision of the ulcer is done rarely by the authors, and only under the guidance of the pathologist.

Prophylactic distal resection is mentioned only to condemn it.

If a marginal ulcer has followed what appears to have been a truly adequate resection, it is often advisable to settle for vagotomy.

WILLIAM E. NORTH, M.D.

Carcinoma of the Bladder: Development and Evaluation of Current Concepts of Therapy. Jewett, H. J., J. Urol. 82:92-100, 1959.

The author beautifully traces the development of the treatment of carcinoma of the bladder. He points out that there is general disagreement concerning the efficacy of each method of treatment, and that no single method of treatment is best for all tumors.

The choice revolves around the stage of infiltration; the capacity of the bladder; location, circumference, number and kind of tumors; the distinctness of their margins, and the condition of the upper part of the urinary tract.

One may well profit by reading the article in its entirety for a better understanding of the treatment of vesical carcinoma.

SHEPARD JEROME, M.D.

Sowing of Small Skin Graft Particles as a Method for Epithelization, Especially of Extensive Wound Surfaces. Nystrom, G., Plast. & Reconst. Surg. 23:226, 1959.

Because of the extensive losses produced by an ever-increasing incidence of burns, the methods described here for covering such surfaces merit the close attention of hospital divisions and personnel who are frequently confronted with such problems.

In a series of ingenious experiments the author has succeeded in improving materially upon Reverdin's plan, first introduced in 1869, for the creation of islands of epithelization in a wound by using particles of autologous skin. The author has developed an apparatus with which a split skin graft the size of a postage stamp can be cut accurately into about 600 particles.

Furthermore, he has improved the method of applying these tiny skin grafts to the recipient site with the outer (cornified) side up, by weighting the skin graft with a plastic material, so that some control was provided. This influenced the grafts to turn right side up when they were permitted to fall through a liquid sedimentation chamber onto a nylon net. Experiments in animals were followed by the treatment of human patients, particularly for ulcers of the leg, after which a set of brilliantly contrived experiments were carried out in which extensive areas denuded of skin were covered with a combination of homografts and autogolous small skin graft particles. The results, although they did not indicate that all of the problems were solved, gave distinct promise of substantial benefits from this technic.

Already the author has plans for improving the technic. He has suggested a more convenient cutting apparatus for preparing the tiny skin grafts. He has also suggested the possibility of influencing the particles by electromagnetic charges for a more even dispersal with the raw side down. He is not yet convinced, however, that it is entirely necessary for the grafts to be directionally placed with reference to the underside's being up or down. In his opinion, nevertheless, this technic will never make obsolete the use of homografts, the protecting power of which in life-threatening extensive burns during some critical weeks may be more important than the disadvantage of a suspected moderate retardation in epithelization of the wound.

THOMAS WILENSKY, M.D.

A Skin Test in Thyroid Disease. Buchanan, W. W.; Anderson, J. R.; Goudie, R. B., and Gray, K. G., Lancet 2:928, 1958.

Intradermal tests, with use of a saline extract of human thyroid tissue as antigen, were carried out in 52 subjects, of whom 33 had thyroid disease. The skin reactions were classified as strongly positive or weakly positive. There was close correlation between the presence of circulating thyroid precipitins and strongly positive skin reactions.

In general, positive skin reactions were observed in patients with Hashimoto's disease or with primary myxedema. With 1 exception, positive reactions did not occur in any person without clinical evidence of thyroid disease. The skin reaction was compatible with an Arthus phenomenon, and the addition of cortisone acetate to the inoculum tended to increase the size of the reaction.

These observations show that thyroid antigen is capable of producing an abnormal tissue reaction in certain patients with thyroid diseases suspected of having an auto-immunizing cause, and they provide a further link between Hashimoto's disease and primary myxedema.

Although the intradermal test may help to elucidate the auto-immune phenomena of human thyroid disease, it should not be used as a diagnostic test. Effective *in vitro* tests are available, and there is a small but appreciable risk of transmitting homologous serum jaundice by the injection of human thyroid extract. Furthermore, such an injection in a susceptible individual may induce thyroid antibody formation.

WILLIAM E. NORTH, M.D.

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